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National and Regional Legislation for Promotion and Support to the Prevention, Control, and Eradication of Invasive Species

Tomme Rosanne Young

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Tomme Rosanne Young [1]

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[1] Tomme Young is currently serving as Senior Legal Officer at IUCN – The World Conservation Union, based in IUCN's Environmental Law Centre in Bonn, Germany.

1818 H Street, N.W.
Washington, D.C. 20433, U.S.A.

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Abbreviations and Acronyms

CBD	Convention on Biological Diversity
Cartagena Protocol	Cartagena Protocol on Biosafety to the Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Fauna and Flora
COP	Conference of Parties
EC	European Commission
ECJ	European Court of Justice
EU	European Union
GISP	Global Invasive Species Programme
GISS	Global Invasive Species Strategy (see Bibliography)
GMO	Genetically Modified Organism (also sometimes referred to as 'living modified organism' or 'LMO')
GSPC	Global Strategy for Plant Conservation
Guiding Principles	Guiding Principles for the Prevention, Introduction and Mitigation of Impacts of Alien Species that Threaten Ecosystems, Habitats or Species, CBD COP-6, Decision VI-23
MOP	Meeting of Parties
NBSAP	National Biodiversity Strategy and Action Plan
PRSP	Poverty Reduction Strategy Paper
SPS	Agreement on Sanitary and Phytosanitary Measures
TBT	Agreement on Technical Barriers to Trade
WTO	World Trade Organisation

No glossary of relevant terms is here provided. Possibly the best existing glossary is reproduced in Scalara, 2004, which is, however, designed for informational rather than legislative purposes. Consequently, although providing a useful basis for understanding this and other discussions of the invasives issue, a glossary of this type, they should not be thought to constitute an "easy access" set of legislative definitions.

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1 Introduction: The Need for Control and the International Response

"Invasive species," "alien species," "alien invasive species," "exotic species," "non-native species," "non-indigenous species," "foreign species," "introduced species," and "pest species" are among many terms used to describe a growing and serious environmental problem that must be addressed at all levels (local to international) of the government, private and NGO sectors. Their potential impacts cover a broad range of sectoral and social factors from the environmental (provoking species extinctions and consequent ecosystemic damage) to commercial (bringing about the destruction of local commercial systems based on agricultural or natural products) to social (altering human-ecosystem relationships and dependencies).

Invasive species have been cited by major intergovernmental bodies as "a leading cause of species endangerment and extinction"[2] and "second only to habitat loss as a major cause of damage to the planet's biodiversity," and "in fact a serious cause of habitat loss leading to irreversible species extinctions."[3] The Global Invasive Species Programme (GISP) noted that "a global estimate of environmental and socioeconomic damage from [invasive species] amounts to 5% of the global economy, or $US1.4 trillion annually."[4]

While significant work has been done to identify, document and quantify the practical elements and needs relevant to governmental efforts to address invasives issue, little has been done to facilitate programmatic action or decisions at national and international levels. Legislators and policy-makers called to make such decisions generally agree that an appropriate legal regime is essential and urgently needed. At the same time, however, a confusingly broad array of factors stymie efforts to develop this regime.

One of the most difficult issues to be addressed in enabling and conducting invasives control measures is simply the need to apply practical legislative reasoning to the process. Very little is known or agreed regarding how to govern and regulate for the control of invasive species, for two simple reasons—

- the fact that introduction of new species cannot simply be prohibited; and
- the lack of present scientific ability to know in advance which species will become invasive.

[2] CBD-COP Decision VI-23, UNEP/CBD/COP/6/23

[3] IUCN's Invasive Species Specialist Group, website.

[4] Sellers, E., et al, (2004) citing Pimentel, D., editor. 2002. Biological invasions: economic and environmental costs of alien plant, animal, and microbe species. Boca Raton / London/New York / Washington DC; CRC Press, 369 pp.

As to the first point, the legislator and policy-maker cannot just order the prevention, restriction or control invasive species introductions, even though many desire simply to minimise introductions. Instead, at some level, every legislative system appears to include some kind mandates that support on the introduction of (or other changes in distribution of) all biological species. Hence, legislation of invasive species issues must always involve a balancing of interests—the interests mandating introduction balanced against the interests involved in protecting natural and agricultural ecosystems from destruction by such species.

However, as noted in the second point, it is not possible to simply regulate against 'harmful' or 'invasive' species, since a new species' impact on any ecosystem cannot be known with certainty. Sometimes many years will elapse following a species' introduction before its invasive nature within its new habitat is discovered . For this reason, it is generally thought necessary to *regulate* the introduction of new species generally (or at least of 'new species that *may become invasive* or *may cause harm.*') This concern illustrates the problem described in the first point above—in order to protected against possible harm, it will be necessary to consider the applying invasive species to every new species introduced to an ecosystem or bounded region.

This suggests that one fact is indisputable: It is insufficient to rely solely or primarily on laws against invasive species, and/or simply to impose liability for the harms they cause. Legislation must, at a minimum be directed at means of identifying invasives and their roles and uses in society, and setting appropriate limits on activities and species that might create invasive problems, now or in future. Even then, unless it is grounded in practical motivations, capabilities and situational realities, the most beautifully crafted legislative instruments will be meaningless or ineffective.

This paper is generally designed to consider questions of "motivation, capability, and reality," and to consider possible legislative approaches for developing countries. It intends to achieve this process in five steps.

> This Part I provides a conceptual and scientific summary and introduction,
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> Part II provides a very brief overview of some of the key global developments in the field,
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> Part III examines in greater detail the legislative tools available for use in the control of species introductions and invasive species, and
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> Part IV discusses some of the special concerns relating to the process of building one or more legislative frameworks utilising the legislative tools described in Part III; and provides, in some cases a brief identification of how the selection of and use of those tools might differ in the developing country context from their use in other places.

Through these sections, this paper examines the nature of the need for national legislative action that can constitute a positive support to the identification, prevention, eradication, and remediation of invasive species.[5] The need for

[5] Note: it is common in papers on this topic to be intensively laced with examples of particular species and their impact upon invasion. Given that this is not a biological paper, it will not follow this practice, Numerous highly qualified authors have provided clear and useful descriptions of recent invasive species problems, providing clear and documented information about these situations and their impacts. See, especially, Sandlund, Schei, et al. 1999; Baskin, 2002. In some instances (where necessary to illustrate a legal challenge or problem or a particular regulatory approach to, or proposal for, its solution) however a few illustrative examples may be mentioned.

such work is more complex than one might expect, for two primary reasons. First, of course, is the extensiveness of the 'pathways' by which invasives problems may arise. The suite of pathways most relevant to a particular country, and the particular elements of those pathways varies greatly even among near neighbours with similar heritage. In some countries' legislation does not address a country's particular national concerns or situation, , instead using 'sample' or 'model' invasive species legislation in an attempt to cover all possible pathways with a single approach, resulting in a compromised structure that does not completely or appropriately address any individual pathway. When used in this way, model laws can often be a bar, rather than a support, to constructive action

Second, the complexity and scientific nature of the invasive species problem is well publicised among decision-makers in many developing countries, as are many past examples, in which ill-chosen solutions have led to enhanced problems. This combination of knowledge and history of failure has created a kind of 'regulatory paralysis' in many countries. Fearing to take the wrong step in addressing invasives, many countries have so far opted not to take any step at all.

The object of this paper is to begin to develop a frame of reference for legal and administrative understanding of the range of invasives issues and possible governmental responses. While it cannot be completely comprehensive, it has sought to evaluate a wide range of national, subnational, and supranational legislation. The work is predominantly a 'desk study' (calling for no national visits, interviews or other on-the-ground evaluation), however, it is informed by the author's prior experience as well as some 'opportunistic' interviews with national legislators and implementing officials dealing with invasive species.[6]

This work was undertaken by the author as a member of the IUCN Environmental Law Centre, under contract from the World Bank.

Conceptual Summary

Underpinning the entire concept of invasives regulation are two very different and equally important concepts: 'invasiveness' and 'pathways.' These can be generally conceived as follows:

- *Invasiveness*: The generic study of invasive species is the study of a very broad range of issues, activities and damages: they are united only by a scientific (factual) similarity—the biological mechanisms by which they cause harm. These include not only preying on native species, but also interbreeding and cross pollination, habitat destruction, alteration of the food chain (or of the availability of essential breeding grounds or nest materials), introduction of parasites and other actions and impacts. These mechanisms are collectively referred to in this paper as 'invasiveness.'

- *Pathways*: While the foregoing paragraph may seem unsurprising, it has one important consequence which has, to some extent, been ignored—the fact that the broad range of 'invasive species' issues share almost nothing in common for purposes of governance. Legislation looks at the way in which government and citizens will identify, regulate, control, oversee, remedy and compensate various kinds of human action and inaction. In the invasives context this

[6] These interviews were not undertaken in any systematic way, but the author would ask about invasives implementation when the opportunity arose in other work undertaken during the pendency of this project.

> may include activities that cause the introduction of invasive species, or exacerbate the harm they cause, as well as the risk, harm, damage and long-term concerns that may result. The human actions to be regulated can be found in dozens (or possibly hundreds) of different elements of human interaction. In general, then, legal/practical aspects of invasive species focus on specific types of human actions—known as the 'pathways' by which invasives enter areas and ecosystems in which they present a risk of harm.

The distinction between 'invasiveness' and 'pathway' is absolutely essential for purposes of this discussion: "Invasiveness" is a quality (a scientific description) of the specimens or species and the manner in which they affect the environment, whereas a "Pathway" is the kind of human action or omission which causes or enables a species to enter and remain in a location or situation in which it can become invasive. Invasiveness can be seen as a unitary concept, whereas there are dozens (or hundreds) of pathways, many of which bear no relationship or similarity to the others for purposes of governance or oversight.

The need for this distinction is simple—it is not possible to legislate against 'invasiveness' (a specimen's characteristics are facts, not faults) but only to address 'pathways.' Moreover, given the multitude of pathways (the manner of counting them often varies according to how a country organises and divides its governmental responsibilities), it is difficult and perhaps unhelpful to attempt to generalise, unify or integrate a country's invasives legislation (i.e., to attempt to address the invasive species issues through a single combined 'invasive species law.')

Summary—the Nature of "Invasiveness"

The characteristic of 'invasiveness' is a subject which has been studied in detail by experts in biological and ecological sciences, and is well described in the works of recognised specialists.[7] To properly understand the legal and practical need for regulation, however, it is essential to have a minimal understanding of several key concepts of invasiveness, and the manner in which it manifests harm to the natural and human-manipulated environments.

In summary, the mechanisms of invasiveness can be collectively described as "the ability of a plant, animal or other biological specimen to spread beyond its introduction site and become established in new locations where it may have a deleterious effect on organisms already existing there."[8] Other definitions focus on the separation of a species from the predators within its original habitat, the change in ecological balances through biological processes, or the nature of its causation (unintended impacts caused by human action.) Invasiveness is generally manifested through one of the following biological processes:

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[7] See, e.g., Sandlund, Schei, et al., 1999. This excellent and relatively comprehensive volume offers policy-makers and others a description of how invasive species impact ecosystems ('invasiveness') and the primary activities that enable that mechanism ('pathways.')

[8] This commonly-used definition is based on the FAO's Glossary of Biotechnology & Genetic Engineering. See, *http://www.biochem.northwestern.edu/holmgren/Glossary/Definitions/Def-I/invasiveness.html*. It is notable that invasiveness need not involve 'alien' species. Changes in an ecosystem may cause a former balance to be lost, and give one species a competitive or other advantage which enables it to overrun its habitat. Similarly, CBD Art. 8h does not actually address invasiveness, calling on parties to 'prevent the introduction of, control or eradicate those *alien species which threaten ecosystems*, habitats or species.' Taken literally, this provision could also address sheep and cattle, which cause damage by overgrazing. These species are not usually expected to survive on their own (and thus are not invasive), but are clearly alien (non-native) in many places in which they are found.

- *Direct destruction* (introduction of a predator that feeds on existing animals or a grazing or other species that feeds on existing plants at rates greater than, or additional to, pre-existing predation levels);

- *Competition and displacement* (utilising the same food, growing spaces, nesting areas and materials, or other ecosystem elements used by existing species, and able to outperform or otherwise drive out those species);

- *Interbreeding* (hybridisation with genetically similar species);

- *Ecosystem destruction or alteration* (changing the physical and chemical characteristics of soil, or other modifications of natural and semi-natural habitats, often causing a loss of ecosystem resilience)[9];

- *Introduction of diseases and parasites* (this item refers to organisms carried by the aliens, which are more destructive to other species in the target ecosystem.)

To the non-scientific eye these factors are relatively easily accepted and understood—the risk of harm to the environment, including to both native and non-native (agricultural) species, from the introduction of a new biological component seems completely clear. Unfortunately, that clarity is not shared by the biologists and other specialists, who note that scientific understanding of invasiveness and how it operates ecologically is still quite restricted.[10] Hence, for example, many introduced species have become invasive only after staying passive (remaining in a non-expanding state) for many generations. At some point, years after introduction, these species 'suddenly became invasive and "aggressive",' expanding to dominate the local environment, for reasons that are not understood and thus currently neither preventable nor predictable.[11]

On the other hand, some researchers have noted, as to some species, that 'we're seeing the same things invading over and over again, and others never invading.'[12] These results suggest that some species rather clearly possess evolutionary characteristics of broad-scale 'aggressiveness' (ensuring survival against a broader range of predators) and others equally clearly do not. As yet this fact has not been generally recognised as a basis for narrowing the field of 'potential invaders.' It may, however, indicate the possibility that scientists will, at some point, identify a specific set of characteristics which predispose some species to be invasive in a larger percentage of cases.[13]

For the present, however, it is agreed in scientific circles that it is not yet possible to develop and apply a system for 'weed characterisation' as a definitive means to determine invasiveness. Some nascent systems have been developed and are being scientifically studied (tested), and one such system is currently incorporated in a national evaluation system. While some companies apparently attempt to use these systems to support claims that their genetically engineered (or conventionally developed) varieties will not become weeds,[14] there is not scientific consensus

[9] For example, in Italy, a rodent, the coypu (*Myocastor coypus*) was originally introduced in the last half of the Twentieth century, for fur-farming. Now naturalized into the landscape, coypus' digging weaken riverbanks and destroys agricultural crops. Panzacchi, et al., 2003

[10] Sandlund, Schei, et al. 1999.

[11] Id., especially Chapters 1, 7 and 8.

[12] Baskin, 2002, Chapter 6.

[13] Apart from GMOs and new hybrids, most species are believed to have at least some ecosystems in which they are non-invasive.

[14] Williamson, 1996, at 61, Baskin 2002 at 132. Some current work on evaluating/predicting invasiveness is described in Mack ,1996, and Reichard, & Hamilton, 1997 (discussed below). These systems examine only whether the species, which is being brought into the ecosystem for cultivation would spread from the area and continue to propagate naturally. They do not consider whether or how they might cause harm to biodiversity.

on the reliability of these systems. The results of such use depend to a large extent on the country in which the varieties are being introduced—both (i) its policy regarding the balance between scientific concerns and industrial and other objectives; and (2) its confidence in its administrative capability—*i.e.*, to monitor, control and manage post-introduction risks.

The converse cases are similarly difficult to predict. Many introduced species are found to require external support to flourish (for example, most agricultural and some ornamental species require regular inputs from farmers, gardeners, ranchers, and others in order to continue to grow and thrive in their new surroundings.) However, even the most delicate species may find some areas in which they are introduced to be particularly commodious, enabling them to interbreed with native or established species, or find other ways of entering the ecosystem on a more permanent basis.

Perhaps most important, invasiveness is a function of two factors—the characteristics of the introduced species, and the particular ecosystem into which it is introduced.[15] As a consequence, even if the consequences of introduction of a particular species are well studied in a particular case, the possibilities remain almost infinite regarding how the same species will impact another ecosystem, even if that ecosystem is nearly identical to the first.[16]

This lack of predictability is one of the most serious gaps in current national and international efforts to address or control invasive species problems. The common approach is to seek to identify a 'blacklist' of invasives[17] or provide some other easily determinable standard that will enable most international movement of species to go forward without interference. However, as noted below, the development of such list mechanisms in legislative or administrative instruments and procedures, can be problematic, particularly where they apply country-wide. In that case, it may be necessary to over-regulate, and to list and attempt to control all species that would or could be dangerous in any of the country's ecosystems. While this approach may provide 'legal certainty' to those who desire to introduce new species or varieties, it may do so at the cost of prohibiting beneficial and useful introductions .

The impacts of invasives are most concentrated, and thus most devastating, in island ecosystems and in lakes with high numbers of endemic species. There is also evidence that ecosystems that have already been modified by human action (especially agricultural areas) are more susceptible to invasion, because an ecosystem that has been forced to adjust to human influences is potentially less stable than a natural ecosystem. Although natural ecosystems are constantly changing, they do so in a manner and at a rate that enables them to become more robust than those which have been changed recently by anthropogenic factors.[18]

One key factor for the administrator, lawyer or legislative draftsman addressing these issues is the scope/definition of any invasiveness problem. Often this discussion focuses not on whether the species is invasive, but whether it is

[15] Comparable research regarding the ecosystem side of the equation (whether a given ecosystem or biome is 'invasion prone or invulnerable') has been less popularized, but is also ongoing. Elton, 1958. More current research on 'invasibility' is briefly described in Baskin, 2002, at 139–143.

[16] H. Mooney, personal communication. It is similarly difficult or impossible to predict the invasiveness of one subspecies or variety within an ecosystem by examining the role of another subspecies. *Id*.

[17] See, e.g., "100 of the World's Worst Alien Invasive Species"

[18] Williamson, 1996

'alien.' Scientifically, for these purposes, 'alien' is not a reference to jurisdictional status (whether the specimens involved or their progenitors have crossed national boundaries), but rather focuses on whether the varieties, species or subspecies are native to (or already naturalised in) the ecosystem in question. In this sense, 'alien-ness' is a matter of degree, rather than a clear-cut distinction, since an astounding level of intentional and unintentional human introduction has occurred over many millennia.[19] Integration of the scientific and legal views of alien-ness can present challenges to the legislative draftsman.

Complicating Factor—Pathways and the Objectives Underlying Species Introductions

The most serious difficulty in legislative control of invasive species is the fact that many introductions of new species are necessary. Throughout a long period of history, the introduction and 'acclimatisation' of species was viewed as a positive contribution to improving the human environment—enhancing food security, 'recovering' desert areas and swamplands for human use, and other key objectives. To this day, humans must often 'tempt fate' by introducing new species for a similar variety of very important reasons. Hence, it is not sufficient simply to impose complete restrictions on the introduction of new species, nor even to call for temporary moratoriums on such actions.

Species introductions occur through a number of mechanisms of human intervention. Typically, these pathways may embody either 'intentional' or 'unintentional' mechanisms:

- Many pathways relate to the conscious decision to bring a new species[20] into an area and introduce it into the uncontrolled environment.
- A large number of other pathways, however, involve the introduction of species as a secondary impact, where a human actor did not have any specific intention to introduce that species.

For purposes of governance and control/elimination of invasives problems, this division between intentional and unintentional introductions begins to demonstrate the problem potentially caused where one attempts to address invasives problems comprehensively. Controls on intentional introductions will be completely different from those needed to address unintentional pathways, with the latter posing the more difficult and persistent problem. Even if the scientists are able to firmly and finally decipher the key to the riddle of invasiveness, that information will only be useful if decision-makers can be aware of all potential introductions, and able to apply their scientific analysis in advance of that event.

Examples of the primary mechanisms of intentional and unintentional introductions may provide additional understanding of the scope and nature of the legislative challenge regarding invasives:

[19] See, Diamond, J. (1998) GUNS, GERMS AND STEEL: A SHORT HISTORY OF EVERYBODY FOR THE LAST 13,000 YEARS, (noting the extent of demonstrated species introduction dating back across nearly 14,000 years of human history and prehistory.) See also, McNeely, J. Ed., (2001) THE GREAT RESHUFFLING: HUMAN DIMENSIONS OF INVASIVE ALIEN SPECIES (IUCN) for a more recent context on human-caused species movement.

[20] This paper will refer to the introduction of 'species' but uses that phrase to include introductions of subspecies and even varieties, where appropriate. In point of fact, many 'species introductions' are actually the introduction of varieties or subspecies, in an area in which other subspecies and varieties of the same species already exist. Such varieties/subspecies may become or have the potential to become invasive, through biological processes (genetic flow and interbreeding) whether native or safely introduced and naturalised.

- *(intentional)* introduction of new agricultural and aquacultural varieties, for purposes of increasing production, expanding markets, and providing food security (varieties resistant to pest, disease, weather anomaly, or other factors that can impact food production in the area);
- *(intentional)* introduction of biological agents as a proactive means to control biological problems (to eradicate alien species, to control naturally occurring or naturalised species whose natural predators have disappeared, to create a limiting factor where a species' natural barriers have been breached or destroyed,, or other controls and balances essential to existing ecosystems) without resorting to chemicals or other methods;[21]
- *(intentional)* introduction of new varieties for gardens, landscaping and other "controlled" introduction purposes;
- *(intentional)* cultivation, fostering or breeding of specimens for long-term study or experimentation;
- *(unintentional)* bringing in pests, microorganisms, seeds, and other 'hitchhikers' hidden in the midst of processes for the
- transport of goods,[22]
- movement of personnel, property and equipment;
- *(unintentional)* the escape and/or release of pets and other specimens that were not intended to be introduced into the environment;[23]
- *(unintentional)* human movement through procedures and mechanisms for actions and operations not directly connected to goods being moved in transit;[24]
- *(unintentional)* spread of released species across jurisdictional boundaries;[25]

Each of these possible pathways may be either 'legal' (permitted or authorised in legislation), 'illegal' (knowing or unknowing violation of law), or 'unregulated' (not directly addressed in law). However, as noted in the previous section, it is not generally possible to specifically list all invasive species, or even to specify a definite set of objectively determinable characteristics of invasive species. Hence, unless the human pathway for all

[21] See, for example, Young, T., LEGISLATION AND INSTITUTIONS FOR MARINE AND TERRESTRIAL BIODIVERSITY CONSERVATION AND NATIONAL PARKS IN THE SEYCHELLES (FAO, 1992–1993), regarding the introduction of barn owls in the Seychelles as a biological control of the growing problem of another (unintentionally) introduced species–rats. The owls found it easier to prey on native species than to take up the task of controlling rats, resulting in an even greater threat to the ecosystem, and a doubling of the number of introduced species causing problems

[22] Although invasive species are often vectors the spread of disease, this paper will generally not consider bacteria, viruses, and other disease-causing microorganisms themselves to be 'invasive species.' These matters are dealt with in other forums. However, the distinction between the species that carry such pathogens and the pathogens themselves may be somewhat blurred in many instances. This paper's focus on the questions of invasiveness (impact on ecosystems) and pathways (human action causing the movement of species later found to be invasive) is intended to avoid the necessity of narrowing the relevant definition. Further aspects of the definitions question are discussed in Part III.A below.

[23] Environmental officials in Indian Ocean countries frequently cite the invasiveness of aquarium fish (released when a family moves from the region) on inland waters.

[24] For example, the intake and evacuation of ballast water in international shipping, as discussed in Part II.C below. Similarly, the transport of equipment for military and other purposes, has been cited as a primary mechanism for movement of species. Scalara, 2004.

[25] CBD meetings often discuss particularly difficult problems in Africa relating to the movement of aquatic invasives through African rivers to infest countries into which they have not been imported in any intentional or formal way.

species movement is controlled, it is essentially impossible to control the entry and prevent the introduction/impact of invasives. Unfortunately, many pathways are not directly or easily regulated, given the fact that regulation must balance the needs for introduction (as described above) against the risks of harm from invasives—risks that cannot at present be easily quantified. As noted above, a great many different sectors and commercial/social purposes may generate direct introductions of species for important national purposes. Regulation of invasive species may take a distant second place to these objectives.

These three elements—

- the type/sector of activity,
- whether its introduction was intentional or unintentional, and
- whether it was legal, illegal or unregulated

constitute the primary bases currently used for addressing invasive species issues. As a practical matter, however, there remains a fourth element—the nature of the introducer/actor causing the introduction or spread of invasive species. From a governance perspective, there are significant differences between (i) large commercial entities, (ii) private individuals and small enterprises (including small farmers and others acting with commercial intentions) and (iii) research institutions and collections. These differences include variance in the introducer's level of intention/willingness to comply with all relevant requirements, as well as his awareness of those requirements, and understanding of the issue as applied to their activities.

Nature of Uses, Harms and Damages

While the agricultural sector is one of the most common sources of intentional introduction of alien species, it is also the sector in which the socioeconomic damages caused by invasive species can be most costly and damaging. The actual social costs, however, are substantially wider than the financial impacts however. Impacts on native ecosystems and species may ultimately lead to a wide range of secondary effects.

Many sources have noted a number of derivative impacts of invasives, which, although not particularly a function of the introduction or invasion, may serve as an indicator of the depth of the interconnection between the alteration of any one ecosystemic/social component with all the rest. For example, the explosion of introduced Nile perch (*Lates niloticus*) in Lake Victoria, in addition to being the apparent cause of the disappearance of 300 of the estimated 500 endemic fish species in that ecosystem is also cited as the indirect cause of the deforestation of the surrounding area, increase the amount of wood cut for smoking the fish caught by local fishermen. This deforestation, in turn, has led to an increase in soil erosion, causing the eutrophication of Lake Victoria and ultimately fostering the invasion of South American water hyacinth (*Eichornia crassipes*) in Lake Victoria. Studies indicate that the presence of water hyacinth has impactedaffects both water consumption and the levels of dissolved oxygen in the water, causing other die-offs within the ecosystem. This chain of events was also blamed for an ultimate decline in traditional sources of local incomes, leading to malnutrition of the inhabitants around the lake.[26]

In addition, natural selection does not cease (but in fact may operate more intensively) in the face of species invasions. Ecosystems adjust around significant introductions, displacements or other

[26] *See, especially* IUCN Regional Office for Eastern Africa, 2004.

major changes relatively quickly—altering migration and use patterns, and creating new dependencies and ecosystemic interrelationships. Thus for example, long established and invasive aquatic weeds in Kenya's Lake Naivasha were discovered to serve an ecological function for the ecosystem as it has evolved following the introduction of these species.[27] Social changes may also alter human interactions, as in the Kafue Flats area in Zambia, where commercial use of water hyacinth fibres (encouraged as a means of involving the public in a mechanical weed eradication programme) has served as a replacement for some livelihoods affected by the impacts of the invasion itself.[28]

Invasive species can also be the focal point of controversy where for example relatively long-established species, which continue to cause considerable damage to ecosystems and agriculture, have over time given rise to local financial uses. In Mauritius, for example, introduced deer generate a not-insignificant income stream for private recreation providers who offer their lands as 'hunting preserves' for a somewhat unique form of hunting referred to simply as 'la chasse.'[29] The deer are a threat to remaining native plants, and the island's fragile pre-colonial (pre-human-habitation) ecosystem, which developed over long planetary ages to create a balance between a range of non-ruminant ground dwelling species (reptiles and birds) and a long-lived hurricane-resistant network of forest plant species.[30] Local efforts to address invasive species concerns must contend with a strong faction supporting the retention of this particular species and sporting activity.

A different kind of controversy is noted in other countries where house pets (particularly cats) have been released locally and 'gone feral' (turned to living off natural sources, rather than returning to their owners.) Their impact on wild and native species, has led to strong calls for the removal of these animals from the wild; however, pet owners often provide an equally strong opposition to such movements.[31]

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[27] IUCN EARO, 2004.

[28] IUCN ROSA, 2004.

[29] The hunters sit in gun emplacements while employees of the hunting reserve drive large herds of deer across their path. A similar example is found in the United States where the State of Florida defends its feral hogs (introduced and harmful invasives) against federal eradication plans, owing to the value of their recreational use by hunters. Klein, Filling the Gaps, 2004.

[30] Personal communication, Wahab Owadalli. Mauritius was not populated by humans until the Seventeenth Century, and its tortoises, avian life (including the 'Dodo bird'), and hardwoods are often cited as examples of the devastation and extinctions caused by intentional and unintentional human action.

[31] On one hand, in Australia, advocates of pet control propose strong measures (one public figure asks cat owners to 'turn your cat into a hat'); in other countries, the advocates of cat protection take a different view. In Cyprus, for example, the movement of foreign expatriates to/from the island has created a substantial population of former housecats which have gone feral. Pet owners have funded an informal 'cat sanctuary,' in which cat food is provided. This sanctuary is very near to a wildlife sanctuary that includes both a migratory bird habitat and a sea turtle nesting beach. A related example of this phenomenon was evident in Mauritius in the 1980s and 1990s, when the project of removing (invasive) rabbits from Round Island was opposed by NGOs, eventually requiring the agency to capture the rabbits, and preserve them in-situ. (These examples are taken from the author's experience in these countries.)

2 Standards and Guidance from International Institutions

Between 1996 and 2002, the issue of invasive species received widespread international attention, beginning with the Norway/United Nations Conference on Alien Species (Trondheim, 1996)[32]—the seminal international expert conference which addressed this issue and the needs for immediate action. The Trondheim Conference generated several major initiatives, and was the main forerunner of the Global Invasive Species Programme (described below.) A primary outgrowth of this meeting was the CBD's work in the development of an international consensus on the importance of and potential methodologies for addressing invasives issues. This process initiated an extremely successful international programme focused on the particular shared needs of governments and others seeking to address or respond to the threats damages and potential damages posed by invasives.

The increase in international political and legal developments and guidelines relating to invasive species issues, since the 1996 meeting has been significant; however, since 2002, some of this momentum has been temporarily lost due to a variety of factors, discussed in Annex 1 to this Report. Even with maximum action at the international level, these initiatives can only be effective through direct implementation at the national level.

The following discussion briefly summarises the basic role of international instruments and action in the field of invasives control and regulation, with particular attention to the manner in which global developments can or must be addressed at the national and regional levels.

To date, work on invasive species issues at the international level (summarised in Annex 1) has focused on two avenues of action: Developing guidance for national and bilateral/regional implementation; and setting priorities and targets for international assistance. With the exception of a small but persistent legal 'glitch' in the adoption of the CBD decision adopting 'Guiding Principles for the Prevention, Introduction and Mitigation of Impacts of Alien Species that Threaten Ecosystems, Habitats or Species,' this work has rather clearly reached the stage at which further global negotiations and instruments are not a priority need. Rather, it appears that the primary focus should be on enabling national and bilateral/regional implementation efforts, through technical assistance and capacity development.

Consequently, in order for current international action to operate as a contribution rather than a

[32] Schei, P.J., 1996.

diversion from effective action, it will be necessary to focus on three actions:

- Financial, technical and human support for national and subregional implementation of invasives-related controls;
- Development of specific standards for international movement of particular types of products, vehicles and other items raising high levels of concern relating to invasive species;
- Addressing the interaction of environmental and precautionary concerns with trade and commercial concerns, including the principles of non-discrimination under the WTO and its (Uruguay Round) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), and the Agreement on Technical Barriers to Trade (TBT Agreement.)

The body of international work on invasives issues that is already completed represents a major contribution of international processes to invasives implementation in national policy. At the global level, the primary elements of that development are embodied in a small number of documents, which are very briefly summarised below. These are, at present, the primary international guidance relating to national and regional invasives-related governance. Nearly all have approached this issue from the conservation perspective.[33]

The CBD Guiding Principles

The Convention on Biological Diversity (CBD)[34] specifically requires its Contracting Parties to—

> *as far as possible and as appropriate… prevent the introduction of, [and] control or eradicate, those alien species which threaten ecosystems, habitats or species.*[35]

In furtherance of this one sentence mandate, the Parties have adopted 'Guiding Principles for the Prevention, Introduction and Mitigation of Impacts of Alien Species,'[36] (the 'Guiding Principles') and undertaken ongoing work 'to identify and explore, from a technical perspective, the threats of invasive alien species to biological diversity, including various pathways for the transmission of invasive alien species.'[37] The Guiding Principles strongly call on parties to

- Apply the 'precautionary approach' (in the form set forth as Principle 15 of the Rio Declaration) in all 'efforts to identify and prevent unintentional introductions [and] decisions concerning intentional introductions,' as well as 'when considering eradication, containment and control measures in relation to alien species that have become established.' In regard to the latter the principles note that 'lack of scientific certainty about the various implications of an invasion should not be used as a reason for postponing or failing to take appropriate eradication, containment and control measures,'[38]
- Give preference to measures that prevent introduction and establishment of invasives

[33] A broad range of international secretariats, and organizations are engaging in invasives related standard development.

[34] Rio (1981)

[35] CBD, Art. 8h.

[36] Generally contained in CBD COP Decision V/8, Annex I UNEP/CBD/COP/5/8 and CBD COP Decision VI/23, Annex, UNEP/CBD/COP/6/23 (discussed below.) As explained in detail in Annex 1, the COP Decision adopting the Guidelines is mired in controversy even as of this writing (nearly 4 years after the decision.) The contents of the document remain of particular interest however, and for this reason are summarised here.

[37] CBD COP Decision VII/13, UNEP/CBD/COP/7/13, paragraph 7, *and see* CBD COP Decision VI/23 (discussed below), UNEP/CBD/COP/6/23, paragraph 9.

[38] Guiding Principles 1 and 10.2.

(over measures for control or eradication), both to increase cost effectiveness and as better protection for biodiversity, [39] and

- Address established invasives (through eradication, containment or control measures) at the earliest possible stage. Although not expressly giving priority to eradication over the other two options, the Guiding Principles indicate that it will often be preferred, and suggest that the other two will be used 'when eradication is not appropriate.'

Regarding governance measures to implement this overall guidance, the Guiding Principles offer only very simple and general recommendations, including

- *regarding 'prevention': The principles call on States to 'implement border controls and quarantine measures.' They further state that 'No first-time intentional introduction or subsequent introductions … should take place without prior authorization from a competent authority of the recipient State'40*

- *regarding 'control'*: they suggest that 'States should consider putting in place appropriate measures to control introductions of invasive alien species … according to national legislation and policies,' and that 'States should have in place provisions to address unintentional introductions [that] could include statutory and regulatory measures and establishment or strengthening of institutions and agencies with appropriate responsibilities'[41]

- *in both areas*, they note that '[c]ommon pathways leading to unintentional introductions be identified and appropriate provisions to minimize such introductions be in place'[42] and

- *more generally*, that 'these measures should be based on a risk analysis of the threats posed by alien species and their potential pathways of entry. Existing appropriate governmental agencies or authorities should be strengthened and broadened as necessary, and staff should be properly trained to implement these measures. Early detection systems and regional and international coordination are essential to prevention.'[43]

The Guiding Principles are primarily intended to motivate national policy level action, rather than specific instructions for legislation. Consequently, they do not offer any suggestion or recommendation regarding legal or institutional measures in support of powers to eradicate established invasives.

The Guiding Principles and the significant level of international interest and involvement in their development were both a major achievement of the CBD and a major indication of global commitment to take action. In the final decision adopting those provisions, the COP urged countries to take other key actions, including the following direct governance requirements:

- Create mechanisms to coordinate national programmes;

- 'Review relevant policies, legislation and institutions… and, as appropriate, adjust or develop [them]';

[39] Guiding Principle 2

[40] Guiding Principles 7.1 and 10.1

[41] Guiding Principles 7.2 and 11.1

[42] Guiding Principle 11.2. It should be noted that this reference uses the term 'pathways' as a synonym for 'governance sectors' rather than its more general definition as used in this paper

[43] Guiding Principles 7.3 and 10.2.

- Promote awareness of invasive species issues and concerns among policy makers at all levels of government…;
- Facilitate stakeholder involvement;
- Collaborate with trading partners and neighbouring countries… to address threats of invasive … species; and
- Develop financial measures, and other policies and tools, to promote activities to reduce the threat of invasive alien species.[44]

In addition, of course, the decision notes the need to address technical needs, including especially the need for more information on invasiveness and particular mechanisms for its prediction and control, as well as other types of research into risks, pathways, control mechanisms, opportunities for co-operation, and the development of various assessment tools. The Parties agreed to promote these efforts both directly and through relevant organisations. Such information must not only be collected but shared—particularly through the CBD clearing-house mechanism.[45]

Global Strategy for Plant Conservation

The 2002 Global Strategy for Plant Conservation (GSPC) is also relevant, providing some additional relevant recommendations—particularly that

- States put 'management plans in place for at least 100 major alien species that threaten plants, plant communities and associated habitats and ecosystems,'[46] and
- No species of wild flora to be endangered by international trade.[47]

These very specific suggestions indicate that the framers of the GSPC support a 'black-list' or 'species-by-species' regulatory approach, and that, although CITES is identified as a primary focus of this target, trade which that does not involve the movement of endangered species is also addressed.

The 2005 IMO Ballast Water Convention

In 2005, a new international instrument was adopted designed to address a particular pathway of introduction of marine invasives—ballast water carried in international shipping. This pathway is one of the most important sources of invasives problems, causing the introduction of an estimated 3000 marine plant and animal species in areas in which they can become invasive and damage fisheries and other ecosystems (Bright 1999). Coastal water ecosystems, which are important for a variety of human and ecological needs from fishing to carbon sequestration, can be heavily impacted by new releases of ballast-water carried organisms and microorganisms.[48]

Under this Convention,[49] each Party must take nine actions to "give full and complete effect" to the Convention's provisions:

- Require ships under its flag or authority to undertake ballast water management activities ("mechanical, physical, chemical, and biological processes, either singularly or in

[44] Guiding Principles §§ 10.b, .c, .e, .f, .g, 11, and 12.b,

[45] *Id*., §§ 24–26.

[46] Adopted under the CBD, by CBD COP Decision VI/9 (UNEP/CBD/COP/6/9.)

[47] GSPC para C (xi).

[48] See, e.g., Sapp, 1999, which discusses the introduction of a pathogen, apparently from ballast water, that caused the near-total destruction of the long-spined sea urchin in the Caribbean.

[49] Adopted February 2004 (not in force.) The full text of the draft Ballast Water Convention is available on line at *http://globallast.imo.org/index.asp?page=mepc.htm*.

combination, remove, render harmless, or avoid the uptake or discharge of harmful aquatic organisms and pathogens within Ballast Water and Sediments");

- Ensure that all vessels within their jurisdiction comply with those requirements, without different treatment of the vessels of non-parties;
- Adopt and apply legal prohibitions and appropriate sanctions, applicable to all of the Party's vessels, regardless of where the violation occurs (based upon reports through IMO);
- Ensure the existence of adequate sediment reception facilities (the use of which does not cause undue delay) at ports and terminals where ballast water tanks may be emptied, cleaned or repaired;
- Make full information available to the IMO and to other Parties regarding their legal requirements, and the location and availability of reception facilities;
- Monitor compliance with ballast water management requirements;
- Monitor and maintain records concerning the effects of ballast water management activities;
- Encourage the continued development of standards and methods for ballast water management; and
- Make scientific and technological developments and monitoring data available to other Parties.

As currently drafted, exemptions would apply to vessels designed in a way that does not enable or require them to carry ballast water, to ballast water discharge that is required to deal with an emergency (not caused by the owner/officer's negligence or recklessness), and to vessels that operate legally and by permission within a single country's jurisdiction. Military and other (non-commercial) government vessels are also exempted. Parties are called upon to ensure that exempted vessels' operations are consistent with ballast water requirements, "so far as reasonable and practicable."

The basic mechanism of implementation is the creation of a "ballast water management plan" for each vessel, including programmes for certification and record-keeping, as well as specific ballast water management practices (pumping, treatment, sediment minimization, etc.). The planning requirement enables each vessel to adopt the procedures that are most appropriate to its configuration, operations and other factors. The goal of planning and certification will be to meet specific ballast water management standards, and such standards are under discussions by the Marine Environment Protection Committee of the IMO.

To enable enforcement of these requirements, the draft Convention provides that the Parties' officials may board and inspect vessels, and where appropriate take and test ballast water samples. Where harmful conditions or practices are detected, inspecting authorities are entitled to "take steps to warn, detain or exclude the ship" until conditions that would threaten health or the environment are remedied.

The draft Convention recognizes regional agreements as a key avenue of practical implementation. As a consequence, it encourages Parties to co-operate in other ways to achieve the Convention's objective including "in a given geographical area to… conclude regional agreements… for preventing and minimizing the transfer of harm-

ful aquatic organisms and pathogens through ships' ballast water". It further imposes a good faith obligation on other Parties to co-operate with such regional agreements, and to develop "harmonized procedures" regarding these regional agreements

International Plant Protection Convention (IPPC)

The International Plant Protection Convention (IPPC)[50] is intended to "secure common international action to prevent the spread of pests affecting plants and plant products."[51] However, its focus on agricultural uses which are, by definition uncontained, enables it also to play a role in the conservation of plant diversity and the protection of natural resources—a role that is recognised in its text and practices. The IPPC extends these protections to wild flora as well as cultivated flora, and to both direct and indirect damage from pests and weeds. As a consequence, the CBD, FAO and IPPC have established a close collaborative relationship. This has in particular extended to the inclusion of CBD concerns in the development of new international standards for phytosanitary measures (ISPMs).

The IPPC has identified potential pest risks that may need to be considered, including:

- new genetic characteristics that may cause invasiveness (drought resistance, herbicide tolerance, pest resistance),
- gene flow (transfer of genes to wild relatives or other compatible species), and
- effects on non-target organisms (beneficial insects or birds).[52]

ISPMs developed under the auspices of the IPPC provide internationally agreed guidance to countries on measures to protect plant life or health from the introduction and spread of pests or diseases. One of the most important concept standards developed under the IPPC is ISPM No. 11, "Pest risk analysis for quarantine pests" (FAO, 2001b), adopted by the Interim Commission on Phytosanitary Measures (ICPM) at its 3rd Session in 2001. In addition, the ICPM, at its 5th Session in 2003, adopted a supplement to ISPM No. 11 to address risks to the environment in order to take into account CBD concerns, especially with regard to invasive alien species. More recently, the IPPC has drafted another supplement to ISPM No. 11 to address pest risk analysis for LMOs.[53]

[50] All references are to the New Revised Text of the IPPC (1997), which entered into force on 2 October 2005. This text attempts to address problems faced in former text revisions, under which it was difficult to identify which "IPPC parties" were parties to the revision, and to understand their relationship to those who were not. In accordance with Article XIII, paragraph 4 of the Convention, the new revised text came into force with respect to all Contracting Parties as from the thirtieth day after acceptance by two-thirds of the Contracting Parties, i.e. on 2 October 2005.

[51] FAO "The State of Food and Agriculture 2003–2004", Chapter 5: Health and environmental impacts of transgenic crops.

[52] These provisions are generally expressed in terms of GMOs, but they are instructive regarding the hitherto incomplete understanding of how the IPPC might apply to macro species manifesting certain characteristics.

[53] This draft standard has undergone extensive technical discussion and consultation throughout its development. It currently lists four potential phytosanitary risks of LMOs that may need to be considered in a pest risk analysis: (i) Changes in adaptive characteristics (drought tolerance of plants; herbicide tolerance of plants; alterations in reproductive biology; dispersal ability of pests; pest resistance; and pesticide resistance); (ii) Gene flow (*e.g.,* transfer of herbicide resistance genes to compatible species; and the potential to overcome existing reproductive and recombination barriers); (iii) Potential to affect non-target organisms (changes in host range of biological control agents or organisms claimed to be beneficial; and effects on other organisms such as biological control agents, beneficial organisms and soil microflora that result in a phytosanitary impact (indirect effects)); and (iv) the possibility of phytopathogenic properties.

Office International des Epizooties (OIE)

Another important element of the body of international invasives instruments, the OIE is an intergovernmental organisation created by International Agreement on 25 January 1924, which is focused on the sharing of veterinary science information as well as mutual reporting regarding the detection or spread of animal diseases in member countries.

It has a specific mandate: "[T]o safeguard world trade by publishing health standards for international trade in animals and animal products." To this end, the OIE develops normative documents relating to rules that Member Countries can use to protect themselves from the introduction of diseases and pathogens, without setting up unjustified sanitary barriers.

Perhaps most importantly, the World Trade Organization recognizes OIE standards as 'reference international sanitary rules,' given that they are prepared and adopted by elected Specialist Commissions and by Working Groups most of whom are drawn from within the OIE's 156 Collaborating Centres and Reference Laboratories It is primarily this status as a WTO international reference organization on biological transfers which has raised the profile of the OIE in ongoing discussions relating to invasive species.

Global Trade-Related Instruments

The international trade framework must be mentioned in this connection, although its impact on national implementation of invasives-control objectives is, at best, mixed. The WTO has raised but not yet resolved a major dichotomy in international processes, which is concurrently impacting many other issues in which global trade and environmental issues have intersected.[54] In the context of invasives, the primary interface (conflict) is often described as the conflict of precaution and science-based trade restrictions. From an environmental perspective, it is clear that precaution must be a primary guiding concept in the regulation and control of invasives, given that the impacts and risks of species introductions are not always predictable, or even oversee-able. In the WTO, however, one primary international regulatory focus is directed to ensuring that environmentally phrased control measures are not disguised efforts discriminate against foreign goods and services.

In brief, debate and controversy over national invasive species controls focuses on the Agreement on Sanitary and Phytosanitary Measures (SPS Agreement)[55] of the WTO, whose primary emphasis is very different from the overwhelmingly environmental, social and developmental focus of all other invasives work. Although in general, invasives regulations are adopted to protect human, animal or plant life or health from pests, disease and other ecosystemic difficulties, the SPS Agreement focuses on ensuring that national laws espousing these objectives are based on science and operate in a manner that enables non-discriminatory application.

[54] The relationship between global trade agreements and other international instruments is roundly debated, and still undecided in many contexts. It is notable, however that 146 countries (out of the WTO's total membership of 149 (as of 11 December 2005) are currently both Contracting Parties to the CBD and members of the WTO. This suggests that these countries have a duty to implement all aspects of both laws. See Young, T., 2004.

[55] While the SPS Agreement is the primary focus of discussions relating to invasive species controls (measures controlling the entry and/or introduction of invasives are generally considered to fall under SPS provisions), other WTO instruments, including the Agreement on Technical Barriers to Trade (TBT Agreement), are also relevant and instructive. See Cooney, R., et. al. 2005; Jenkins, 2004.

Box 1: The Precautionary Principle and Preventing of Alien Invasions: Tensions between Trade and Environment Regimes

While invasive species can wreak economic (as well as environmental) havoc, having major impacts on existing agriculture, forestry, fishing or shipping, the global trade system by which most species movements are facilitated is more focused on the extent to which invasive species controls can interfere with commercial relationships and transactions, and can have a demonstrable impact on current/immediate profits. This focus sets up a tension between the WTO's approach and those of other environmental agreements, including the CBD, which focus on broader and longer term impacts,

- calling for the application of a precautionary approach to preventing spread of invasives,
- implying or requiring risk analysis in advance of any intentional introduction (rather than only where there is some evidence of threat), and
- suggesting that only those species unlikely to threaten harm to this wider set of issues, including biological diversity (see CBD VI/23 Principles 1, 10) should be permitted to be introduced.

Source: (Cooney, 2004)

Typically, one can avoid trade sanctions by being scrupulously equal in applying legal requirements and restrictions to both domestic and foreign goods. In the context of invasives species controls, however, this approach is nearly impossible, because it is necessary for invasives protections to focus special attention on the movement of foreign or alien goods to other ecosystems. Consequently, in addition to basic restrictions on discrimination against foreign trade, the SPS Agreement requires that any measure to restrict imports must be based on "sufficient scientific evidence" and risk assessments.

The key issue to be addressed by the international community in reconciling ecosystemic, social and development-oriented IAS issues with trade issues is the relationship between precaution and this direct requirement of scientific evidence. For this purpose, the 'precautionary principle' (sometimes known as the 'precautionary approach') embodies the concept (or in some cases the specific commitment)[56] of action to protect against the possibility of harm in situations in which there is not currently sufficient evidence of risk) As further discussed in Part IV.B, below, the CBD principles require up-front action where there is doubt or some indication of risk (even if science has not yet demonstrated that a risk does or does not exist), where the SPS requires scientific evidence of risk before any restriction can be imposed.

For legislative purposes, the challenge is not whether a country may impose precautionary measures to control possible introduction of invasive species, but whether these laws can be phrased and applied in a way that satisfies WTO

[56] Within the last 5 years, "Precaution" has moved from its old "home" in the preamble of many documents, now residing in mandatory text provisions in the Cartagena Protocol on Biosafety, and the Convention on Persistent Organic Pesticides. The still controversial aspects of the "Precautionary Principle," when applied in the context of natural resources management, have been addressed in a major project—The Precautionary Principle Project—undertaken by a consortium of NGOs, including IUCN, TRAFFIC, Flora and Fauna International, and Resource Africa. Its outputs and recommendations are available online at http://www.pprinciple.net/ .

scrutiny.[57] WTO legal processes, however, are often not replicable and may be difficult to predict. Hence, these issues constitute an uncertainty in addressing invasives legislation, rather than a known obstacle for which a reliable practices can be applied.

Finally, it is important to mention here that issues of "alien species" are not definitionally limited to international movement. Many critical pathways are not international, but involve primarily 'domestic' introductions (introduction of a new species from a different habitat within the same country.) Others involve unintentional transboundary movement (individual actions by non-commercial entities, spreading of species along rivers or throughout landscapes that are transected by national boundaries, etc.) None of these issues is directly addressed by international trade legislation.

International Co-operation and the Global Invasive Species Programme (GISP)

In 1998, three major institutions, each providing and representing a different perspective on the issue joined forces in a coordinated effort to increase knowledge and understanding of invasive species issues and challenges and to help identify potential policy solutions and guide movement toward developing and implementing them. In that year, IUCN-The World Conservation Union, (representing conservation issues); CAB International (CABI) (representing agricultural perspectives), and Scientific Committee on Problems of the Environment (SCOPE) (representing the scientific coordination and research perspective) agreed to an informal but highly effective partnership to promote urgent and necessary action on invasives. Currently in a state of reorganisation and with a much broader group of partners, the GISP defines its mission as "to conserve biodiversity and sustain human livelihoods by minimizing the spread and impact of invasive alien species." Its specific mandates are to "improve the scientific basis for decision-making on invasive species; develop capacities to employ early warning and rapid assessment and response systems; enhance the ability to manage invasive species; reduce the economic impacts of invasive species and control methods; develop better risk assessment methods, and strengthen international agreements" through a combination of public education, improved scientific understanding; and development of legal and institutional frameworks, codes of conduct and other tools for quantifying the impact of invasive species.[58]

[57] In this connection, it is worth noting that the CBD has sought observer status in the WTO for many years—so far not been unsuccessfully, despite the overwhelming identity of membership between the two instruments. More recent efforts are focusing on finding a way for the CBD to be recognized as an expert body for purposes of scientific analysis of biodiversity impacts under the SPS Agreement.

[58] This information is available at *http://www.gisp.org/*. The GISP is based in Capetown, South Africa.

In preparing Parts III and IV of this report, the author has reviewed more than 90 legislative instruments.[59] Although it is not possible to be completely comprehensive in this review, the documents reviewed include 'hard law' (laws and regulations), and other instruments (guidelines and non-binding codes).

In reviewing these documents, the author noted that an overwhelming majority were directed at particular purposes that predated the direct consideration of invasive species issues. Similarly, even in the case of laws that were adopted specifically to control invasiveness, it was immediately clear that the final adopted documents are the outcome of an internal negotiation process, reflecting the particular political and social balances within the country on several levels. Hence, the specific language (and sometimes the overall coverage) of each provision cannot be presented as a model or primary recommendation. Given the object of this report (preparation for further work and technical assistance in development of invasives legislation), the author has attempted to provide citations to various legislative examples; however, those citations are not intended to recommend the cited laws or provisions, but only to provide a starting place for the development of further documents and/or the provision of direct technical assistance.

These two Parts take the following approach—

- PART III identifies a variety of legislative tools that can be and/or have been used in invasives regulation, providing some specialised information about the particular issues and problems to be addressed when utilising these tools. It does not list every possible legislative provision needed, but focuses on six key 'challenge' areas which are more or less unique in how they are addressed in the context of invasive species control.

- PART IV then describes the policy/legislative processes to be used in developing a framework utilising these tools. Its discussion is focused generally on developing countries—and governance and political issues unique to them.

[59] Legislation was selected based solely on the criteria that, as indexed, it addressed in a direct manner, some aspect of invasive species controls or concerns. (Rather than simply considering every law that could be located mentioning species or species control (agricultural seed sector regulation, animal welfare laws, and laws relating to zoos, for example, were not generally relevant.)) Hence, the author cannot claim that she has reviewed all relevant legislation, even in the countries listed. The source of nearly all national legislation reviewed for this report was the ECOLEX database—a single-source online library of national and international instruments. It can be accessed at *www.ecolex.org*. Many of the laws examined are listed in the bibliography, however as that list lengthened, it has not been completed.

In any country, moreover, legislative analysis will require a more detailed inquiry into the role of species introduction legislation within the broader national legislative framework. This requires consideration of laws based on legislative objective and institutional structure, focusing on how the law supports, directs and mandates countries, government agencies/officials and individuals to take action to and/or to address particular harms and pathways of invasive introduction.

3 Tools of National Implementation

Implementation of invasive species commitments and shared priorities at the national level is essential for all countries, including those not party to any of the relevant international instruments. Studies at the national level show that the problem of invasive species is virtually universal.[60] In the face of these needs and mandates, however, regulatory measures on invasives issues are relatively few in number, and address or control only a small percentage of the problems and issues that have been identified as needing current attention.

A small number of commentators describe the problem of invasive species as well understood and manageable.[61] The overwhelming majority of sources cited in this book, however, recognise that the recent explosion in extinctions of wild species and impacts on agricultural and other activities caused by (intended and unintended) alien species introductions is a cause for alarm, and an indication that present complacency on the part of many authorities is an inappropriate response.

The results of this review highlight the limited impact of legislative responses to invasive species even among the most developed countries. Few countries or regional groups have, as yet, found a way to effectively merge the scientific elements of invasives control with administrative tools to form effective system for addressing the possibility that introduced species may become invasive, or for controlling (or even recording) species introductions pending a final determination regarding invasiveness. The most frequently noted examples of countries that have adopted invasives legislation (for controlling the introduction or at least the transboundary importation[62] of harmful invasive species) are, unfortunately all developed countries—Australia, New Zealand, the United Kingdom, Denmark, and the United States. Although New Zealand's legislation is also cited for its relatively comprehensive coverage.[63] As noted below, however,

[60] Studies carried on in the EU, although recognized not to be exhaustive indicate that all countries are seriously affected by alien species. Scalara, 2004

[61] See, for example, FAO has recently stated that "National phytosanitary authorities have a long experience in the assessment and management of biological risks related to the introduction of organisms. They possess the knowledge of how to deal with risks posed by plant pests. This existing infrastructure and know-how could be utilized by environmental authorities in their efforts to implement the guiding principles of the CBD." FAO 2003.

[62] Although there is no difference in terms of 'invasiveness,' there is a clear legal difference between introductions from outside of national customs boundaries, and those from another ecosystem in the same country. The European Union has become quite aware of this difference, because within recent memory it has changed its rules regarding movement of goods (including living things) among European countries. Through the Schengen treaty, which eliminated customs controls among 13 of the EU Member States and Norway and Iceland, it has allowed free transmission of alien species among countries, and is now seeking to address invasives issues through other approaches (described below.)

[63] Shine, et al (2002) at ¶4.3.4, cite New Zealand as closest to providing an overarching framework, but note that it is not 'unitary' (apparently 'not embodied in one comprehensive law.') Citing NEW ZEALAND Hazardous Substances and New Organisms Act of 1996, and Biosecurity Act of 1993.

the system which in many ways appears to offer the most promise to date is found in México—a developing country.

There are many calls for guidance for national legislative and administrative systems for the control of invasive species. A few attempts have been made to respond to these requests, focusing on academic (model law) approaches, excerpts from various national legislative documents related to, and restatements of general guidance from international decisions and instruments. In terms of specific guidance on new legislative development processes, however, these documents have not focused on the most difficult and specific problems of invasives legislation, but have instead devoted primary attention to international policy concepts such as prevention, precaution, cost recovery, public participation and access to information, along with risk analysis and EIA.[64]

In keeping with this paper's objective of stepping beyond work to date, and actually initiating the process of legislative and practical legal implementation of invasive species control, this section examines a specific legislative tools and approaches that have been proposed and/or applied in legislation of various countries. It will form the basis of Part IV, which looks at how these tools might be utilised and integrated into relevant national legislation, particularly in developing countries.

This part is organised broadly into six sections, representing the six primary challenges for invasive species legislation:

- Identification,
- Regulatory control
- Oversight/monitoring,
- Regulatory empowerment (including compensation),
- Funding, and
- Transboundary cooperation.

As noted above, each of these challenge areas presents a combination of scientific and governance concerns. This paper will focus on the latter. For each component, the paper describes one or more existing/established approaches to addressing the particular objective or need identified, and the general problems and obstacles related to making these approaches work. These discussions are preparatory for Part IV of this paper, which examines how these specific mechanisms can be integrated into the development of national and sub-regional legislation in developing countries.

Identification

As noted in Part I, the primary challenge of invasive species is knowing which species are or may become invasive. It is typically impossible to predict with any reliability in advance whether a species will become invasive. As a consequence, the Global Strategy on Invasive Species states "Every alien species needs to be

[64] *See, e.g.,* Shine, *et al.,* at 3.2–3.3—citing the Rio Declaration (Principle 15), CBD (preamble as well as Art. 8h), SPS Agreement (Art. 5.7—cited "in a limited way" as 'advocat[ing], requir[ing] and allow[ing]' precaution), FAO Code of Conduct for Responsible Fisheries, the Cartagena Protocol on Biosafety, the _arhus Convention on Public Access to Information …, and the Espoo Convention on Transboundary EIA. It is noted that most of these do not specifically refer to invasive species, and many have no direct reference to biological issues and the transboundary movement of species or specimens. Other principles, not specifically mentioned in this list include the "polluter pays principle" (Rio Declaration, 1992) and the concept of sustainable use (CBD Arts. 1, 2, 6 and 10, as well as recently adopted Sustainable Use Principles in CBD-COP-7.)

managed as if it is potentially invasive, until convincing evidence indicates that it presents no such threat."[65]

There are many factors that introduce risk into that management process. In particular, the delay between introduction of a species and the first indication of its invasive impacts can be very long. This time period can be insidious, in that it may enable the species or its seeds, spores or impacts to spread very widely before national processes for inventorying and monitoring biodiversity can begin to recognise the serious nature of the problem. By the time an appropriate reaction (eradication or control measures) can begin, effective remedial action will usually be complex, costly, and uncertain to fully achieve its objective.

Consequently, for lawmakers, the 'identification challenge' is to develop laws that merge the country's highest reasonable level of scientific application with a realistic analysis of the risks and benefits of proposed introductions, so that invasive species controls maximise protection for biological diversity and biologically-related industries (agriculture, forestry, tourism, etc.) without unreasonably restricting the achievement of essential national objectives in other areas (food security, forestry, etc.)

After a brief discussion of the manner in which the identification issue relates to the question of the overall scope of the law,[66] this section considers three basic approaches to identification: Lists, evaluative descriptions, and scientific models.

In general—Scope of Species/Specimens Covered

The first step in the identification process is that of categorizing the overarching limits on coverage: Which species must be addressed by invasive species controls? The minimum concern is canvassed above –- the fact that legislators cannot make an advance determination that some categories of new or recently introduced species should not be considered to be "invasive species." Even if this (troublesome) term were easy to define, it would not be possible to simply know that a species is invasive without some kind of formal consideration (discussed in the following sections.) Hence, it is necessary to consider all introductions of species at some level, to determine which are invasive, or alien, or non-native, etc.

Coverage vs. Regulation

The substantive coverage issue is best addressed as two questions:

- What do you want to regulate (control)? and;
- How can you identify it for regulatory purposes?

The first question is rather easily answered—most countries want to regulate/control the introduction of *harmful or potentially harmful* species. The second question, however reflects a greater difficulty, as the only way to identify the harmful introductions is to be aware of all introductions. Legislatively, this raises two primary points:

[65] McNeely et al. 2001.

[66] In this connection, the author notes that it is best to develop legislation based on an overall view of the legislative objective. The final decisions regarding 'scope' and coverage of the legislation are best based on the analysis of the context of the legislation as it developed. As such, although they are typically found at the beginning of legislation, they are typically among the last elements written.

1. Detailed efforts to define "invasive," "alien," "native" and similar terms, while potentially useful in the legislation, often distract the legislative process from the primary work of the legal system. It may be more appropriate to focus instead on what kinds of human action are controlled, and assume that all biological specimens involved in such actions must be screened in some way to determine whether they must meet requirements under invasiveness-oriented species laws. For example, it may be better to focus primary definitions on "introductions," and "activities leading to introductions" (e.g., importing, marketing, etc.) and leave the question of whether the particular specimen should be regulated to the regulatory mechanisms applied when an introduction is proposed (parts 2, 3, and 4 below.)[67] In a number of laws examined for this report, for example, there is no specific legislative distinction between 'non-native species,' and 'invasive species.' In essence, these provisions assume that longer term strategic analysis relating to invasive species can only be developed out of a generic view that considers all non-native species.

2. If the legislative context requires[68] a definition of 'invasive species' or 'native species'[69]—whether to distinguish covered species from non-covered species,[70] or to create varying sub-categories of covered species. In this connection, a variety of approaches may be relevant, including—

   - all species are alien that are not found on the continent or in the country as of the adoption date of the legislation;[71]
   - all species are native (or at least unregulated), if they existed within the

[67] While most laws that are styled or indexed as "invasive species" legislation focus on the definition process, many other relevant laws (seed laws, agricultural development laws, ballast water controls, etc.) focus on pathways without specific mention of particular species characteristics. (*See, e.g.,* the Ballast Water Convention, described in above.)

[68] Legislative specialists can often be distinguished from non-specialist lawyers by their approach to the use of definitions. It is generally inappropriate to begin the drafting task with a lengthy discussion of either scope, formal statement of legislative objectives, or definitions. Rather, it is usually more productive to develop the general provisions based on working concepts, and identify the need for and configuration of definitions, scoping limitations, and final statements of objectives from the text, designing these tools to best serve the needs of the draft law. (This process often can limit the number of useless provisions and definitions—a primary objective of a good legislative draftsman.)

[69] Although there may be an effective distinction, the author does not see a difference between (i) defining "alien species" (and applying the law or some provision to species that meet such definition) and (ii) identifying "native species" (and stating that they are exempt from the law or some particular requirements of it.) Hence this discussion will not detail the various choices of term.

[70] The terminology may vary including a variety of words and phrases expressing foreign-ness, such as 'native,' 'alien,' 'non-indigenous,' and 'exotic,' as well as terms expressing invasiveness, including 'harmful,' 'pest,' and 'weed,' as well as 'invasive.' The choice among these terms usually makes virtually no difference. What is essential is to define and use the terms in a consistent way appropriate to the level of legislation being developed (see below.) In this connection, it is probably advisable, at the national level to coin and use a term that is different from the international terminology.

This is standard advice given in most processes of legislative implementation of international agreements. It is more essential in the invasives context, however, as a result of a long (and now notorious) discussion in CBD SBSTTA-6 over the choice between "alien invasive species" or "invasive alien species" in the COP decision. As the order of adjectives makes no substantive difference (a "brown two-story house" is no different from a "two-story brown house"), this discussion was completely nonsensical. Its primary impact was to impress on many delegates the idea that CBD terminology could be fraught with potential interpretation problems, in court or administrative contexts.

[71] *See, e.g.,* UNITED STATES (Illinois) Exotic Weed Act, 525 ILCS 10/2 (' "Exotic weeds" are plants not native to North American that, when planted either spread vegetatively or naturalise and degrade natural communities, reduce the value of fish and wildlife habitat, or threaten an Illinois endangered or threatened species'); GERMANY (federal) Nature Conservation Act of 1987 ('native species' includes both those which have existed or evolved in Germany and any alien species which has naturalised in the past).

particular target ecosystem[72] or other geographically defined area[73] as of a particular (earlier) date; or

- species are native only if they acquired their individual characteristics in the area (ecosystem, district, country, region, continent).

The choice of terminology and the contents of definitions used in legislation are completely individual, based on legislative needs. However, it also indicates the level of risk that the particular legislative system is willing to accept. If a law generally enables introductions (without government permit or other oversight) of any species native to the continent, this indicates that the legislators have confidence in the ability of government agencies to monitor, control and manage invasives problems on a reactive (post-introduction) basis. The decision to control species more narrowly suggests a preference for addressing these problems prospectively.

In many situations, a definition's primary legislative role may be to empower officials to exclude species that may cause environmental harm. In that case, it might be appropriate to focus on the particular ecosystem involved, and on species that have originated in that place or been present for an extremely long time[74] Conversely, where the legal focus is on control rather than prevention, the listing process may be focused on a presence within the continent, and based on a recent date (such as the date of adoption of the legislation). Existing instruments and definitions provide little direct assistance, and are an inappropriate guide, given the distortions that can arise when adapting new or model legislation to particular national (ecological, economic, social and other) situations.

A number of countries have also adopted species-specific legislation individually addressing particular alien species of concern.[75] Although a rather unsatisfactory method of dealing with the breadth of the alien species problems facing most countries (given that invasives problems are often either irreversible or extremely costly by the time a particular invasion is known and legislation on in enacted), such measures may be particularly useful where a known invasives problem is sufficiently harmful and has reached the urgent stage in which more general measures may not be strong or high-profile enough to provide any help.

GMOs and Invasives Law

The relationship between invasives controls and genetically modified organisms (GMOs)[76] raises concerns in a variety of ways. Operationally, there is no particular reason to separate GMOs from other species when considering invasiveness issues, and many countries take this approach.[77] GMOs are, by nature, alien

[72] See, e.g., UNITED STATES Executive Order 13112 of February 3, 1999.

[73] *See, e.g.,* BAHAMAS, National Biosafety Strategy, Draft, 2005; NEW ZEALAND Hazardous Substances and New Organisms Act of 1996, and Biosecurity Act of 1993; CANADA Fish and Wildlife Act, 2004, c.12, s.1, Chapter F-14.1 (defining 'exotic fish' and 'exotic wildlife' to include any that are 'not indigenous to the Province' in which the species is to be introduced, for wildlife, it also the species must be 'in its natural habitat, usually wild by nature'.).

[74] *See* Serra, 2003 (present-day efforts initiated to eliminate a pest introduced into Majorca and Minorca in Roman times.)

[75] See, e.g., UNITED STATES Non-Indigenous Aquatic Nuisance Prevention and Control Act of 1990 (preventive measures against further introduction of the Zebra mussel (*Dreissena polymorpha.*)

[76] Also known in the Cartagena Protocol on Biosafety and some national law implementing that instrument as "living modified organisms" or "LMOs." Given that there is no discernable difference between the two terms, the author will use "GMO," because it is the more commonly used of the two.

[77] *See, e.g.,* BAHAMAS, National Biosafety Strategy, Draft, 2005; NEW ZEALAND Hazardous Substances and New Organisms Act of 1996, and Biosecurity Act of 1993

everywhere. This suggests a clear need to address their potential invasiveness, given that an introduced natural variety may be invasive in an ecosystem that already contains a related variety. An altered variety may also be potentially invasive, even when introduced in an ecosystem in which the recipient, parent or donor organism is native.[78] In some cases, moreover, legislation controlling GMO introductions addresses very similar concerns to invasives legislation.

On the other hand, however, the minimum requirement of the Cartagena Protocol, for all GMOs requires various processes (licensing, risk assessment, etc.) only on the first international (cross-border) entry/introduction of the a new species in the recipient country.[79] Thereafter, the variety may be brought into the country and marketed without additional permission. Although the Protocol allows countries to enact stricter legislation, it does not specifically discuss stricter options. Given the similarity between GMOs and invasives for regulatory purposes, it may be appropriate to find ways to integrate the two issues, creating similar mechanisms and triggers, rather than trying to find some definitional divider that allows a different standard for GMOs than for other alien species. At a minimum, it will be necessary to determine whether introduced GMOs will be required to comply with both sets of requirements,[80] and if so, how the two systems will interrelate.

Microorganisms and Invasives Laws

One issue that sometimes complicates discussions of invasive species legislation is the question of 'microbial alien species.' The movement of microorganisms, which are generally not visible or detectable to non-laboratory inspection, is undoubtedly a serious problem. From a practical and operational perspective, however, it is an issue which only partly overlaps with invasive species issues.

Typically, laws governing invasive species focus on species that are intentionally introduced or transported, and those which the human actor knows or should know might be included in his shipment or other activity. By contrast, most movement of microbes, including intestinal and blood parasites and other life forms, is not only unintentional, but may also in most cases be unknowable to the human whose action causes the introduction or transportation.

Responsibility with regard to alien species introductions, however, is generally based on existing legal concepts of liability and legal duty. As a legal matter, a person is not held responsible for something he could not have known about, unless his actions can be legally defined as "ultrahazardous activities"—a specialised legal term, referring to activities creating a risk of harm so great that the actor is liable for all harms caused, even if he complied with normal standards of risk protection. Alien species introductions are not legally considered to be either 'known hazardous' or 'ultrahazardous,' except where the particular species is known (before introduction) to be uncontrollably invasive or seriously harmful in the recipient ecosystem, or where the introducer did not take reasonable

[78] In fact, it is usually preferred, in order to avoid interbreeding with native species, that GMOs should not be introduced in areas containing wild relatives of the recipient or parent species. MÉXICO's CONABIO operational procedures.

[79] This minimalist approach is also mentioned in the CBD Guiding Principles.

[80] Although the multiplicity of governmental approvals is frequently bemoaned by businesses intervening in international negotiations, the author is aware of no country in which any business or other commercial activity is only subject to a single unified permit system. The object with regard to GMO law and invasives law will be to ensure that there is no needless duplication in the substantive requirements of the two laws.

measures to protect against known risks. Hence, an introducer cannot usually be held responsible for introducing a microorganism unless

(1) he intentionally introduced the microorganism directly (*e.g.,* for nitrogen fixing, as bioremediation, in containment that is breached, etc.);

(2) he knew that the microorganism was present on the specimens he introduced;

(3) he introduced a species that is known to frequently be infected by, or a carrier of, the microorganism;

(4) he introduced a species whose known characteristics suggest that the introduction is 'ultrahazardous'—so that he is liable for all harms resulting from the introduction, whether knowable or not; or

(5) there is a complete lack of data concerning the species being introduced or its probable impacts, but he introduced it anyway.

There is, moreover a basic difference in approach between phytosanitary and invasives legislation. Typically, the implementation processes relating to invasives are directed at preventing intentional introductions and, where possible, unintentional species introductions, at the 'macro' level. That is, it attempts to filter introductions that are known or knowable. Operationally, the invasives provisions usually begin from a consideration of the animal or plant itself, and address associated risks (hitchhikers and disease) only as an adjunct to that initial approach. Health and sanitary/phytosanitary laws, by contrast, begin from the question of potential disease vectors, including parasites and other hitchhikers, and apply those considerations. These two legislative objectives are typically separate, while closely coordinated with one another. This paper does not consider phytosanitary law in detail, considering 'invasives' to be a separate, integrated issue. Numerous sources, however, consider invasives regulations as health and sanitary laws, and assume that phytosanitary mechanisms will satisfy the needs of invasives control.[81] These documents, although not covering the majority of the elements required in order to address invasives issues, provide a good basis on which to build an understanding of the relationship between the two concepts.

Relevance of the Coverage Concept to Identification

Beyond the foregoing legal analysis, the coverage of invasives law must be determined operationally. The primary coverage approach described above requires that all proposed actions of non-native species (however defined) must be evaluated, to determine whether the particular species

- may never be introduced (outside containment);
- may be introduced subject to conditions and controls; or
- may be introduced without controls.

This determination may be made on the basis of law, regulation or scientific models. The fol-

[81] *See, e.g.,* Writings on and under the International Plant Protection Convention, as well as International Standards for Phytosanitary Measures (ISPMs) and systems developed through the IPPC framework, and Regional Plant Protection Organizations (RPPOs). *See also,* German Federal Ministry for Consumer Protection, Food & Agriculture, Report on the workshop Invasive Alien Species and the International Plant Protection Convention: An expert consultation of phytosanitary services and environmental protection agencies (22–26 September 2003). As a result of this workshop, the International Plant Health Risk Assessment Network has been formed to develop methods to harmonize the implementation of phytosanitary pest risk analysis.

lowing three sections discuss the primary tools available for meeting this 'identification challenge,' and categorising species. These processes are relevant beyond the question of introduction, as they may determine the extent of government and private obligations to eradicate infestations, take remedial actions, and engage in other invasives protection measures.

Lists

Operationally, the adoption of species lists is among the simplest mechanisms for identifying species that should be subject to controls or other evaluative processes. So long as the implementing officials are able to identify listed species (in applications, in border control stations, in the field or elsewhere), they can apply whatever regulatory measures are specified for listed species. List-based approaches also have limitations, however, primarily relating to the reactive nature of list creation and list alteration and the inflexibility often applied in laws using list mechanisms. As a result, over time, three primary list-based approaches have developed—the so-called "black lists," "white lists," and "grey lists."

Black lists

'Black list' is the shorthand term generally applied to statutory (or statutorily mandated) lists of 'known' invasives and harmful species. Such lists typically include species that have already been identified as harmful within the ecosystem (or the continent, region, country, or sub-national jurisdiction (state, province or districts), depending on how the regulation is ordered.)[82] As such, a black list is generally a reactive mechanism—that is, species are only listed after a factual determination that they are invasive or harmful.[83] Usually, by the time such a determination can be made, serious harm may already have occurred.

To partially address this problem, listing processes frequently also include species that have been publicised internationally as being particularly harmful.[84] As noted above, although it is not possible to identify invasiveness in advance, some species have been found to be so aggressive that they can generally be expected to prove invasive in most habitats into which they are introduced.[85]

The use of black lists, and particularly the inclusion of generically identified species on the list may, of course, result both in over-coverage (listing species that would not be invasive in the particular ecosystems in which they might be

[82] Numerous black-list laws exist, including, for example AUSTRALIA (Commonwealth), Environmental Protection and Biodiversity Conservation Act 1999, § 301A (which authorises, but apparently does not mandate, the establishment and maintenance of a list of non-native species that threaten biodiversity in the Australian jurisdiction); COLOMBIA *Por el cual se reglamenta el Código Nacional de los Recursos Naturales Renovables y de Protección al Medio Ambiente y la [Ley* 23 *de* 1973] *en materia de fauna Silvestre* (Decreto No.1608) 31 Jul. 1978 (blacklists as one part of a broader approach); FRANCE *Loi en eu douce et à la gestion des resources piscicoles* (*Loi* n° 64–512) 29 Jun. 1984 (sectoral law blacklisting aquatic species.)

[83] For example, the EUROPEAN UNION (in Council Regulation (EC) No 338/97 of 9 December 1996 on the protection of species of wild fauna and flora by regulating trade therein (Official Journal L 061 pp. 0001–0069) 03 Mar. 1997, which merges invasive species concerns with more general restrictions on species trade under CITES), lists 'species in relation to which it has been *established* that the introduction of live specimens into the natural habitat of the Community would constitute an ecological threat to wild species of fauna and flora indigenous to the Community' (*emphasis added.*) It is thus necessary to formally establish invasiveness within the EU in order to apply this Regulation's limitations. *See also,* EUROPEAN UNION Commission Regulation (EC) No 349/2003 of 25 February 2003 suspending the introduction into the Community of specimens of certain species of wild fauna and flora (Official Journal L 51) 26 Feb. 2003.

[84] See, e.g., "100 of the World's Worst Alien Invasive Species" (pamphlet produced by the IUCN Invasive Species Specialist Group, available English and Spanish at http://www.issg.org/)

[85] Weber, 2003.

introduced) and under-coverage (omitting many species that will ultimate prove to be invasive.) However, pending the development of more dependable scientific criteria, listing of these species may be the most effective method available to address a significant component of high-baseline invasives risk in a regulatorily simple way.

White lists and Biodiversity Inventories

The use of white lists represents the opposite list-based approach—that is, to define species whose introduction is predetermined to be acceptable. This approach is integrally connected to one of the primary (but manifestly underutilised) operational tools created under the Convention on Biological Diversity—the biodiversity inventory and database.[86] Both mechanisms focus on species that are already introduced in relevant ecosystems, and are known or believed to be non-harmful.

White lists[87] and biodiversity inventory databases[88] have a primary orientation of attempting to ensure that invasives regulation do not unduly interfere with commercial transactions and development. To be effective in this endeavour, white lists must be relatively comprehensive, but must also be based on a scientific and field evaluation, given the fact that some species may have spread without specific notice, and that the passage of time may disclose invasive characteristics in species formerly thought benign.

Critical questions that should be (but are not always) answered in legislation relate to the re-evaluation of listings, and particularly to the manner in which new species are added to the list. In this connection, a few countries have built their overall systems for controlling new species introduction on the basis of the Cartagena Protocol as a model. Specifically, they have provided that only the first international introduction of a particular species must undergo the permitting process.[89] In essence, once the first introduction of a species has been allowed, it is effectively added to the white list. This can be seen as a standard minimum approach, in that it would mean that the government will be called to make a decision on each species only once. In effect, this approach concludes that the administrative process of the first introduction is conclusive proof of the safety of all future introductions, regardless of the possibility that later introductions will involve different ecosystems, or that the first experiences might disclose characteristics that will alter the agency's evaluation of subsequent applications.

Amalgamating List Approaches

Inevitably, initial simplified list approaches have been amalgamated, typically by either of two combination approaches:

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[86] CBD, Article 7. The design of the CBD appears to revolve around these inventory and database requirements as a mechanism that underlies and effectuates the remainder of the Articles. Young, T. 1993. Relatively few countries, however, have developed or utilized their inventories in this way. Among the best examples of this process are found in México where comprehensive databaseshave been developed that can be of use in such evaluation. A few other countries have similar databases, in varying states of development (currently less comprehensive.) *See, e.g.,*MÉXICO Comisión Nacional para el Conocimiento y Uso de Biodiversidad (CONABIO) and COSTA RICA Instituto Nacional de Biodiversidad (InBio); and CHILE Reglamento de Internación de Especies de Primera Importación (Núm. 730) 28 Nov 1995, at Art. 7.

[87] BRAZIL Portaria n° 83-N (26 Sept 1991); ESTONIA Approval of Legal Acts Established Pursuant to the Seed and Plant Propagation Material Act and the Forest Act (Regulation No. 66/1999) 7 July 1999 (White list for commercial introduction of forest species); CHILE Establece Nomina De Especies Hidrobiologicas Vivas De Importacion Autorizada (Núm. 531) 05 Jun 1992.

[88] COSTA RICA Reglamento a Ley de Conservación de la Vida Silvestre (Decreto No. 26435 MINAE) 1 Oct. 1997 (Cap. VI is the database.)

[89] *See, e.g.,* TAIWAN Wildlife Conservation Act of 1989 as amended, at § 27. *Compare*, Cartagena Protocol on Biosafety.

- A specific black list whose members are all subject to strict restrictions, and another specific 'grey' list, whose members are all subject to a more flexible list of requirements, with all species not on either list considered to be on the 'white list' of freely introducible species;[90]

- A combination of black list (strictly restricted or forbidden) and white list (allowed with minimal formalities) and an interim 'grey list' for which more detailed evaluation (see sections 3 and 4 below) is required.[91] Typically, the law will specify which treatment will be accorded species that are not yet listed.

In many cases, the lists involved are quite short, often because they represent a 'legislative heritage'—that is, a list that was generated and adopted initially for a narrower purpose (agricultural weed control, aquatic channel clearing, *etc*.) and have more recently been identified as the national programme on invasive species (or a part thereof).

Lists may be used in a variety of ways. A leading country in the development of controls on species introductions, New Zealand, specifically provides an expedited procedure for approval of applications where the alien species is not listed as an 'unwanted organism,' subject to other specific approvals.[92]

Listing Pathways

One option that has been suggested but not clearly enunciated in the reviewed legislation is the listing of pathways, as a means of identifying particular kinds of introductions that should be given particular kinds of attention. This approach, too, has a basis in the CBD, whose inventory requirements include the requirement to "processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity, and monitor their effects through sampling and other techniques."[93]

In essence, this approach recognises certain pathways that can have a broader impact, requiring special attention and proof prior to introduction. Like other list approaches, this is a broad-brush tool, but can help in prioritising the work of government agencies, as well as focusing efforts on particular pathways requiring attention. For example, numerous studies have shown that ornamental species are the largest pool from which invasive species are derived, so that importation for these purposes bears a relatively high risk of invasiveness.[94] Particularly as countries try to unify or regularise

[90] BELGIUM (Walloon) *Arrêté de l'Exécutif réglant la mise en liberté dans la nature des espèces…* (defining the group of species to be controlled in terms of the fact that they are not contained on any of three categories of lists: lists of game (hunting law), lists of fish and shellfish, and other lists of indigenous species compiled by appropriate (nature conservation) authorities.)

[91] COLOMBIA *Por el cual se reglamenta el Código Nacional de los Recursos Naturales Renovables y de Protección al Medio Ambiente y la* [*Ley* 23 *de* 1973] *en materia de fauna Silvestre* (*Decreto* No.1608) 31 Jul. 1978, (Introduced species are Title III, procedures are VI); CHILE *Determina Especies Exoticas Que Pueden Perturbar El Equilibrio Ecologico Y La Conservacion Del Patrimonio Ambiental (Resolución No*. 863 exenta) 26 Mar. 1999; and *Establece Nomina De Especies Hidrobiologicas Vivas De Importacion Autorizada* (*Núm.* 531) 05 Jun 1992; ICELAND The Nature Conservation Act (No. 44/1999) 22 March 1999, at Art. 41 (authorising the use of white/black lists, but not requiring it.)

[92] NEW ZEALAND Hazardous substance and New Organisms Act of 1996, at § 35. In addition to absence from the list, the agency must be able to find that it is 'highly improbable' that the species will become invasive (form a self-sustaining population, displace a 'valued species,' damage habitats, communicate disease, or become parasitic.)

[93] CBD, Article 7(c).

[94] Documented in Weber, E., 2003; Groves, 1998 (statistics indicating 10 new invasives in Australia each year more than 65% of which enter the country as 'garden plants.')

their invasives-related legislative processes, this approach may be useful to create a policy basis for deciding which risks to accept subject to oversight (risks related to important objectives such as food security) and which to prevent or to control more rigorously (commercial use non-native species, that might use native or white list species.)

Evaluative Standards

Complex regulatory permitting provisions in many different contexts are typically founded on legislative provisions specifying the regulatory limitations, objectives, information provision and other requirements that must be met by the applicant and the government, respectively, in order for a permit to be granted. These standards of evaluation also provide a basis for the adoption of specific conditions and requirements under the permits, and for determining which species should be covered, and how they should be monitored.[95]

In the context of invasives, it is reasonable to expect that this kind of approach will eventually be developed for most commercial pathways. Some countries have already adopted this approach specifically to address species introduction issues, with national legislation that identifies specific concepts and objectives that must be met for each introduction. One of the most frequently cited, New Zealand's 'biosecurity' approach, includes a long list of objectives and issues to be 'taken into account,' including the 'life supporting capacity of air, water and soil ecosystems,' as well as issues of economic and social wellbeing. It identifies several specific situations in which no introduction may be allowed, including actions which would cause

- Significant displacement of a native species from its natural habitat,
- Significant habitat deterioration
- Significant adverse effects on human health and safety,
- Significant adverse effect on the countries biological and genetic diversity
- The importation of disease or parasites.

Despite their regulatory detail, the criteria for deciding permit/introduction applications are decidedly imprecise, calling for refusal if the government feels that the introduction might alter ecological balance, affect the economy or modify the fulfilment of legislative objectives.[96] In some cases, it is possible to adopt more precise standards and measurements in regulations, standards or other documents, to enable fair and replicable decision-making processes, presumably relying in part on public and expert input from outside the governmental sector.

Other sources provide only very general legislative guidance on the responsibility issue and in this way may effectively place the burden of predicting invasiveness on the introducer. For example, the EC's 'Wild Birds Directive' requires Member States to 'see that any introduction of species of bird which do [sic] not occur naturally in the wild state in [their] territory does not prejudice the local flora and fauna.'[97] Similar

[95] CUBA Regulaciones sobre la Diversidad Biológica (Gaceta Oficiál 631/1996) 28 Nov. 1996 (Cap. III is invasives; Art 15. sets criteria for analysis.)) Internationally recognized examples of this process are found in the CITES processes for the granting of import and export permits, its standards for determining the significance of the effects of wild harvest and international trade on the species, and its criteria the listing of species. These standards and criteria have been adapted by each of CITES's member countries and adopted in regulatory form, as a primary requirement under that Convention.

[96] This sampling of generic provisions is taken from ARGENTINA Ley 22421/1981, cited in Shine, *et al* at 57.

[97] EUROPEAN UNION Directive on the conservation of wild birds, Directive 79/409/EC, Art. 11.

provisions are found in the 'Habitats Directive,' under which 'the deliberate introduction into the wild of any species which is not native to [the] territory [of a Member State] is regulated so as not to prejudice natural habitats within their natural range or the wild native fauna and flora and, if they consider it necessary, prohibit such introduction.'[98] Little practical discussion of the means by which such a prohibition might be legally and practically created and implemented is possible in an EC document, and none is found in these Directives, apart from strong requirements that the issue be included in environmental impact assessment.

Scientific Processes and Formal Standards for Risk Evaluation

In a few countries, the nascent science of predicting invasiveness is being used in the creation and application of formal, detailed scientific analytical systems for determining whether a species should be allowed.[99] One such system, the Weed Risk Assessment or WRA, has been formally recognised for use by the Australian Quarantine and Inspection Service, as an adjunct to its black lists process (see Box 2). This system is designed to impose scientific rigor, identifying the data to be reviewed in the application process, and creating a weighted mechanism for that review.

The use of these systems evidences the disjuncture between legislative provisions and current approaches to scientific analysis. The WRA is, to some extent, based on the assumption that

Box 2: Weed Risk Assessment (Australia)

The WRA operates by adding new processes to the procedures for approval of new species introductions, after it is determined that the species in question is not contained on either of the 'white lists' currently in use in Australia.

This process is couched in the form of a questionnaire containing a series of 49 questions about the new plant. Each question must be answered with available documented scientific evidence. Some of the questions include the following:

- does the plant form dense thickets?
- is it spread by animals?
- is it a weed (as defined) in any other place in which it exists or has been introduced?

While most of the questions focus on presumed indicators of weediness, some relate to indicators of low risk. A point-based scoring system is applied based on the answers to each question (point scores increase for weediness, and reduced for answers that indicate low risk.) Scoring also considers the strength of the evidence provided in each case. Plants may be introduced if they score 0 or less. A score 5 or higher will result in denial.

Those scoring between 1 and 4 it must be evaluated further, typically by undertaking additional research to generate more information. If this reconsideration results in a changed score, the plant will be accepted or banned accordingly. If the score remains in the 1–4 range, further evaluation will be required. This process will include a cost–benefit analysis rather than a precautionary approach.

This system is notable because it is felt to target environmental weeds (species that can become invasive and thereby harm the environment) as much as economic weeds (species that can have a negative impact on agriculture or other commercial activities, and increase costs.) It has been utilised officially in New Zealand and has attracted interest from other countries.[100]

[98] EUROPEAN UNION Council Directive on the conservation of natural habitats and wild fauna and flora, Council Directive (92/43/EEC) at Art. 22

[99] AUSTRALIA Australian Weeds Committee, 1994, *Screening plants for weediness: A procedure for assessing species proposed for importation into Australia*.

[100] Low, T., 2006

science can predict invasiveness, an assumption that is, as yet, not entirely correct. For example, one typical 'rule' that is frequently used as a criteria for determining the invasive potential of a plant species has been the breadth of the species' native ecosystem. If a species inhabits a large tract in its area of origin, it is thought to be "pre-adapted to a wide range of abiotic factors" and thus able to invade more easily.[101] This 'rule' has been demonstrably broken, however, by a number of highly aggressive plants, which have been introduced in various places on the basis of narrow breadth of their 'home' ecosystem and which have later proven invasive.[102]

In many countries and sectors, moreover, determinations related to species introductions are not localised or based on the particular ecosystem, so that each approval of an introduction will be a basis for introducing the species anywhere in the country. Even where alienness is recognised to apply at the ecosystem level, decision-making may be national or provincial.[103] Few countries regulate internal movement of species, usually at a regional, rather than ecosystem level.

In a small number of cases, however, scientific analytical proposals address the fact that the determination of invasiveness is based on facts that must be determined at a very localised level. México, for example, notes that invasiveness and other impacts of species introductions can only be determined 'on a very narrow case-by-case basis.'[104] México's system focuses on the gathering of information from a substantial systematic database including detailed scientific resources on both domestic and foreign species, and a detailed database containing location-specific information from the country's national biodiversity inventory. Through this system, the deciding body can analyse proposed introductions on the basis of the location in which it will be introduced.

The system is strongly 'precautionary' in that it assumes that a species introduction should not be allowed within a specified range of ecosystems in which its wild relatives are found. As a consequence of this approach, an applicant's chances of success improves dramatically according to the level of specificity of his application. If the applicant can identify very exactly the place (farm, city, district) in which the species will be introduced, the analysis can be very specific. Consequently, the final decision can be simpler, the chances of a positive decision will increase, and fewer restrictions will be imposed—although the introducer will have responsibilities to ensure that the species will not spread or be transferred beyond this range. Where the application proposes introductions throughout the country or a particular state, the scientific analysis is more likely to discern potential risks of invasiveness (particularly interbreeding issues), thereby increasing the chance of denial of the application.

One interesting factor can be discerned by comparing standard approaches to alien species introductions to the models used in assessing possible GMO introductions—the level of similarity to local species. In numerous laws relating

[101] Wittenberg, 2003.

[102] One recently noted European example is Giant Hogweed (*Heracleum mantegazzianum*)—an ornamental that has been widely introduced throughout from the Caucasus over the past 200 years.

[103] UNITED STATES The Lacey Act (regulating transfer between States, but not addressing smaller scale.)

[104] Interview with Francisca Acevedo, Comisión Nacional para el Conocimiento y Uso de Biodiversidad (CONABIO). CONABIO's detailed information collation system is utilised in all introductions, with special attention to GMOs. Similar approaches are authorised in other countries, including FRANCE Décret fixant les conditions d'autorisation d'introduction dans les eaux visées à l'article 413 du code rural de poissons, de crustacés et de grenouilles appartenant à des espèces qui n'y sont pas représentées (Décret n° 85–1307) 9 Dec. 1985.

to alien species introductions and reintroductions, a priority is given to species that are near relatives of indigenous species and species that are already naturalised in the area. These presumptions are based on the belief that ecological relationships will be less impacted by a close relative of a local species, than by a completely different species. By contrast, scientific analysis of GMO introductions frequently proscribes all introduction of GM species that are closely related to native species, particularly where the GMO's wild relatives (relatives of the parent or recipient species) in the region.[105]

Regulatory Control Measures

The second challenge of invasives legislation is the process of regulation/control of species introductions based on their potential to harm or impact other species and the environment. The precise wording and application of tools for addressing this challenge are to some extent integrated with the identification criteria that are selected and applied.

Primary Prohibitive/Restrictive Language

Typically, statutory resource management programmes are permission-based—that is, they focus on a system of controlled approvals to ensure that use of resources is sustainable. As its primary legal basis, however, such a system begins with a generic prohibition or restriction—i.e., 'no person may introduce XXX without specific written permission…' Despite frequently stated preference for 'prevention' of the introduction of aliens (as the surest method of preventing invasives from taking hold) rather than simply controlling those introductions,[106] it is not possible to simply prohibit the introduction of non-native species. Permission systems must both address the need to minimise the risk of harmful species, and recognise that there are very many situations in which the introduction of living specimens, seeds, and other biological material is not only to be permitted, but actively encouraged for a wide variety of social, economic and even environmental purposes.

Such systems have a strong commercial relevance, suggesting that legislation must provide a basis for determining which species are covered, and must categorically exempt any species for which no permit will ever be required. This kind of specificity is difficult, however, for legislators who realise that their words will later be applied to situations that were never considered at the time of drafting the legislation. Consequently, these systems nearly always provide a wide range of options to the decision-maker and a relatively strong level of discretion, to enable proper response to particular and generic situations in which the introduction of living specimens, seeds, and other biological material is not only to be permitted, but actively encouraged for a wide variety of social, economic and other purposes.

This basic fact is often a source of confusion and difficulty in developing invasives legislation. It often invokes legislative fears that official discretion may obviate the value of invasives control generally. However, concerns about excessive regulatory flexibility can usually be addressed by separate provisions addressing each of the various kinds of introduction situations (an option that is encouraged by this paper). In this way, each kind of decision (each sector, biome and purpose) relating to an introduction can be specifically regulated and subject to clear and review-

[105] MÉXICO, for example, as a Vavilov 'centre of origin' of maize, places strict, criminal restrictions on all attempts to bring GM maize into the country, even for contained research.

[106] Such preferences are most obvious in the CBD Guiding Principles and IUCN Guidelines, but also appear in a number of national laws and strategies.

able legal standards, with an appropriate level of overseen discretion, without undoing more rigid controls that are necessary in other contexts.

In the context of species introductions, however, somewhat unique issues arise. The basic prohibitions necessary to control invasiveness may be phrased in two ways. On one hand, such a prohibition is simplest to adopt (but most difficult to apply) when it is phrased in terms of the unrestricted/uncontained introduction of invasive or harmful species which are alien to the ecosystem.[107] No right thinking official would oppose a provision prohibiting such introductions.

However, the regulation of such a prohibition is difficult. It would require that governmental officials and private actors must be able to recognise objectively separate qualities about each species that might be introduced. Namely, to know whether that species was 'invasive' or 'harmful,' whether it is 'alien' to the ecosystem into which it will be introduced, and whether the measures taken for oversight of that introduction constitute 'containment' for these purposes. At a minimum, such an approach must be based on the adoption of specific and detailed black lists, their broad publicisation, and the development of specific administrative capacity to enforce them.

Where not willing to predetermine which species will be considered 'invasive' for this purpose, however, the prohibition must be more general (prohibiting all introductions without permission)—a provision that enables the regulators to investigate invasiveness and other characteristics on a more individualised basis. This approach typically uses an evaluative standard or scientific model.[108]

One obvious and related issue relates to the nature of 'introduction.' The nature of regulation is such that one cannot speak of legislation mandating anything other than human action. However, legislation may address conditions that are not caused by human actions (or that cannot be proven to have been caused by human actions) where, for example, the regulation addresses governmental or private mandates to take action to address, minimise or protect against the condition. Hence, as with most other aspects of law, the nature of 'introduction' under invasives legislation depends on the nature of the responsibilities and human actions addressed within that legislation. Typically, invasives law either assumes or defines the concept of introduction, to rest on human actions and pathways.[109] Perhaps the most important aspect of this concept relates to whether the human causation factor is direct or indirect—whether human actions would be considered to be 'introduction' and therefore subject to regulation where the action, for example, was to eliminate a predator or other ecosystem component causing a formerly naturally controlled species to become invasive.

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[107] *See, e.g.,* CHILE *Establece Normas De Ingreso De Material Biologico Y Deroga Resoluciones Que Indica,* 24 Sept. 2001 (prohibiting the introduction of harmful invasives in a variety of forms ('*Insecta, Arachnida, Diplopoda, Chilopoda, Pauropoda y Crustacea, moluscos terrestres o dulceacuícolas, invertebrados carentes de apéndices, tales como Nematoda y Anellida, plantas nocivas, hongos, bacterias, virus, viroides, micoplasmas o cualquier otra forma de organismo que en forma directa o indirecta pueda dañar las plantas o el medioambiente*') without appropriate permission); UNITED STATES Bureau of Land Management regulations (prohibiting the introduction/use of alien plant species in site restoration activities on leased federal lands)

[108] *See, e.g.,* MARSHALL ISLANDS Endangered Species Act 1975 (Title 8 Cap 5) § 10. ('it is prohibited to import … exotic plants and animals … into the Republic except under permit by the Secretary as defined in the regulations authorized by this Chapter.')

[109] *See,* HUNGARY Nature Conservation Act of 1996 (defining an 'introduced organism' to include any organism that has become part of Hungary's flora or fauna due to intentional human action); UNITED STATES Executive Order 13112 (including as 'introduction' any 'intentional and unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity.)

Regulating Introductions

Given the difficulties and uncertainties in identification processes described above, the only truly 'sure-fire' way to eliminate the negative impact of invasive species is to prevent all 'alien' species introductions, and to promptly eliminate all specimens of recently or inadvertently introduced species—an impossible and undesirable objective, in light of the many national priorities and objectives that must be served through the constant interchange of agricultural and other products. The political reality, moreover, is that the livelihoods of many persons in any country (from landscape gardeners to dealers in aquarium fish) depend on alien species.

Consequently, the third challenge is regulatory—to assert control on the introduction of species, in a way that (i) enables the system to apply whatever identification techniques it adopts for determining the likelihood that a species will be 'invasive' in the habitats in which it is introduced; and (ii) imposes appropriate levels of restriction on species introduction, based upon the level of risk or uncertainty in the decision-making process. The challenges of this component revolve around each State's ability to screen materials entering the country; to find, recognise and distinguish alien and native species; and to know where (in which ecosystems) the species will be introduced.

Applying Controls on Introductions

Perhaps the most troubling element in regulating species introductions and preventing the spread of invasive or harmful species is the need to find one or more defined places or situations which can serve as 'control points.' Policy-makers often assume that controls will be asserted at national borders—an option that is particularly appropriate for large international commercial introductions, but may be difficult to enforce with smaller and non-commercial activities, and may require intensive capacity development in regard to unintentional introduction of hitchhikers and parasites.

In some (particularly developed) countries, border control mechanisms (specifically 'the surveillance of entry points and facilities') are designated as the primary means of invasive controls.[110] However, in other cases, the problem of pervious borders may make this approach to regulation quite difficult. Moreover, after species have entered the country, they may be multiplied, sold or otherwise cease to be under the control of the person or entity who brought it in into the country, before it is introduced into the environment. Perhaps most important, the focus on national border controls may also eliminate any possibility of addressing introductions between states, subnational regions and ecosystems.[111]

The second primary mechanism for applying controls has been monitoring. As more specifically discussed below, physical surveillance of lands and species is an essential element of invasives regulation. This responsibility is recognised in legislation, both directly[112] and indirectly.[113]

[110] *See, for example,* Council of Europe "European Strategy on Invasive Alien Species" Doc. T-PVS (2003) at 7, discussed in Genovesi, 2003, at 7.

[111] *See* note 74, above, and accompanying text.

[112] *See, e.g.,* Council of Europe "European Strategy on Invasive Alien Species" Doc. T-PVS (2003) (requiring as a second mechanism in addressing invasives problems, the surveillance of 'areas where severe disturbance has occurred (land clearance, storm damage, etc.)')

[113] *See, e.g.,* AUSTRALIA Biosafety Act (imposing responsibilities for ecosystem planning and restoration, based on governmental determinations, which must necessarily imply a governmental surveillance obligation.)

Restrictions on Species Introduction and Permits

In addition to generalised oversight requirements, the application of regulatory controls turns on the need to impose specific requirements and restrictions on the permits themselves, when issued. Such permit conditions may be generic (applicable to all permits) or specific (imposed on a permit-by-permit basis.) This process of imposing conditions on regulatory permits is not noticeably different in the context of species introductions than in other natural resource contexts, with one exception. Unlike many kinds of natural resource permit, a species introduction permit constitutes a kind of 'negative use' permit. Its object is not to regulate consumption levels in regard to the use of a natural resource, but to ensure that an external resource does not harm pre-existing resources within the ecosystem, area or country. Consequently, the main condition imposed on a particular permit will usually involve monitoring or otherwise addressing off-site impacts, events and conditions.

These provisions are sometimes difficult to impose upon private individuals (who will not have a right to enter or monitor the lands of others.) This fact carries two implications. First, governmental responsibility for oversight of the holder's compliance with his permit may involve a higher level of direct involvement than where permit conditions focus on oversight and documentation of activities and lands within the permit-holder's control. Second, however, the permit restriction and the manner in which it is fulfilled may affect the basic responsibility and liability of the permit holder.

The importance of permit conditions as restrictions and mandates cannot be over-emphasised, in light of the regulatory limitations inherent in the primary mechanisms (border control and direct surveillance). For example, such conditions can be imposed on commercial importers for retail sales (imposing responsibilities for informing purchasers about their responsibilities), on agricultural introductions (limiting the geographic area or ecosystem in which the species may be introduced), and on containment and surveillance.

Enabling Programmatic Responses

One of the most important challenges of invasives-related legislation is that of strategic planning, whether for species recovery, for habitat recovery or directly for invasives eradication. A wide variety of such laws exist,[114] varying widely in their level of oversight/control over invasives planning processes, in essentially the same way that laws on other types of natural resource planning vary among countries. Thus, for example, some provide detailed descriptions of the contents of strategies, the manner in which they must be adopted and reviewed, and the involvement of the public, while others describe only general authority and intentions. Relatively few such laws specify in detail the particular activities that must be undertaken, although most presume that the implementing agencies or individuals will be empowered to take the necessary measures.

In this regard, there are generally reckoned to be four primary response measures for control of species that have become invasive:[115]

1. Mechanical control (systematic or non-systematic cutting or other harvesting of plants or animals);

[114] *See, e.g.,* NEW ZEALAND Pest Management Strategies, discussed in Biosecurity Act of 1993 at 56–70.

[115] This list seems to arise by common consent, although no single source is cited for it. A good example and discussion is found in IUCN-EARO, 2004.

2. Chemical control (herbicides, insecticides, rodenticides, etc., which may in some cases be very closely targeted to particular species);

3. Biological control (the importation of biological agents that prey on, repel, interfere with, or otherwise impact the invasive species); and

4. Habitat management (altering the site conditions in a way that makes them less commodious to the species.[116])

In combination, these measures are often referred to as "integrated pest management" or IPM. IPM programmes are most effective where all options are available, but controlled by both pre-planning and post-implementation monitoring. However, in some countries, the law may prevent the use of one kind of measure (for example, prohibiting all new species introductions, except for agricultural species, controls on unpermitted hunting, etc.),[117] creating obstacles that ultimately add to the invasives problem. Hence, a balance of provisions (enabling and controlling) and mechanisms for interaction with agencies controlling various pathways, are essential to implementation of IPM and more generally to the control of invasive species.

A number of kinds of empowerment are found in various laws, from the right to declare a 'biosecurity emergency' (under which government has broader rights to take eradication actions, including entering and using private property)[118] and a narrower right to take 'rapid response measures' (such as imposing quarantine or other containment requirements on incoming shipments of goods or vehicles thought to be pathways for 'hitchhiker' invasives, and to seize and destroy infested property, if necessary) in the event that certain criteria are met.[119]

Eradication, Bioremediation, and Restoration of Native Species

Although costly and difficult, the eradication of invasive species, remediation of their negative impacts, and restoration (or allowing the natural reintroduction) of native species and ecosystems are critical elements of invasives control. To date, such efforts have met with varying levels of success, depending on context, and in some cases have actually resulted in additional harm.[120] Typically, the issues and options involved are addressed in the positive—that is, in the context of recovery of threatened or endangered species, promotion of safe and/or pesticide-minimising agricultural practices, and other positive objectives.[121] Under these laws, removal of non-native species which impede these objectives is one authorised action within the framework of a larger 'species recovery plan' or 'integrated (agricultural) pest management strategy' or similar governmental action.

In a few laws, however, there are stronger mandates. Particularly in the agricultural context,

[116] One example of this is the alteration of water chemical content, by imposing measures to minimize the amount of fertilizer chemicals that find their way into a river or wetland. IUCN-ROSA 2004. This is particularly effective where, as here, the invasive species thrived in replacing a species whose numbers were depleted as a result in the alteration of the acidity of the watercourse. *See also,* BULGARIA Fish Husbdandry Act (State Gazette No. 91/19.11.1982)

[117] This is currently a problem in several countries bordering the Caspian Sea (Iran, Russia, Azerbaijan, Turkmenistan and Kazakhstan), that are currently investigating appropriate and integrated approaches to the eradication of aquatic invasives. (Personal communications with Lev Neretin, Vladimir B. Salnikov, Hikmet Alizade, and Boris Chaikin.)

[118] NEW ZEALAND Biosecurity Act of 1993 Part VII.

[119] AUSTRALIA (Northern Territories) Fisheries Act.

[120] Stories of efforts to eradicate alien species by bioremediation, which instead resulted in an additional harm to native species, are relatively common. *See* note 21, above.

[121] AUSTRALIA Environmental Protection and Biodiversity Conservation Act 1999; UNITED STATES, Endangered Species Act of 1973.

strong powers are frequently given to agricultural ministries and agencies to identify weed species (based on their impact on agriculture, regardless of whether domestic or 'alien' or whether they have other impacts on biodiversity) and lands infested with them, and to mandate that the landowner must eradicate such species or face penalties.[122] Typically, such strong provisions require direct oversight and enforcement, as such actions must begin with a government order to a landowner noting that an infestation has been identified (otherwise, the landowner may not know that plants which exist on his property are the subject of these strictures.) Failure to act carries possible penalties and the government may enter the land and take the eradication measures directly, if it chooses.[123] In a few cases, the law imposes a general requirement on the landowner to know and eradicate weeds without any initial notice from government.[124] The author has not been able to determine whether any such laws have actually been enforced without *de facto* use of the same mechanism (government discerns the nature and presence of a weed and notifies the owner that it must be eradicated within a particular time period, etc.)

One element of this process that has been incompletely addressed in many legislative systems is the application of the science/standard-based decision process to introductions that are undertaken as remedial measures. In some countries, remediation processes are specifically exempted from regulation as a species introduction.[125] In other countries, the species introduction controls are sufficiently strict that they impede the initiation of remediation plans.[126] Taken individually, these provisions would either be over-strict or over-lenient. The ultimate solution, of course, is somewhere in the middle—typically by integrating invasives issues in legislation relating to the development of ecosystem- or species-rehabilitation plans.[127]

Incentives and Recommendations: Promoting Positive Actions

One frequently overlooked mechanism for invasives control relates to encouraging the use of native and approved locally adapted species. These mechanisms can be used to avoid the need to apply any kind of provision or risk analysis to uses of non-native species in these contexts, and may be thought of as mechanisms for diminishing the role of and demand on government, as well as simplifying the lives of regulated persons. Many of the strongest such provisions appear in seed and other agricultural law, although the regulatory statements of standards and objectives in these laws may need

[122] See, e.g., SOUTH AFRICA, Conservation of Agricultural Resources Act of 1983; UNITED STATES (various state laws, for example, Illinois, 505 ILCS 100/10) (various 'noxious weed' laws require persons owning or controlling land to destroy or control listed noxious weeds found on their lands. These provisions rely on local implementation and enforcement mechanisms. One of their primary tools is the power of the governmental authority to enter private property and destroy these species and bill the property owner for these costs. In some cases, the law allows these costs to become liens against the property, or to be added to the property owners tax bill.) See also Klein, Making a list, 2004

[123] *See,* UNITED STATES (Hawaii) HI Revised Statutes, §§152–6.

[124] *See, e.g.,* SOUTH AFRICA (Mpumalanga Province) Nature Conservation Act of 1998, as reported by Stein, R., 2004.

[125] CHILE *Establece Normas De Ingreso De Material Biologico Y Deroga Resoluciones Que Indica* (24 Sept. 2001) (Allowing exceptions from the basic prohibition on invasives for biological control agents, with permit; honeybees (subject to other controls)); MARSHALL ISLANDS Endangered Species Act 1975 (Title 8 Cap 5) § 10 (an exception from species introduction requirements for 'beneficial insects and biological control microorganisms … imported in accordance with the plant and animal quarantine laws of the Republic. [COM P.L. 6–55, § 10 (1975); 45 TTC 1980, § 110, modified.]')

[126] See note 119 above, as one example.

[127] *See, e.g.,* COLOMBIA *Por el cual se reglamenta el Código Nacional de los Recursos Naturales Renovables y de Protección al Medio Ambiente y la [Ley 23 de 1973] en materia de fauna Silvestre (Decreto No.1608)* 31 Jul. 1978, at Art. 129; AUSTRALIA Biosafety Act.

to be adjusted to ensure coordination with invasives standards and processes.

By and large, the use of generically described 'incentives and subsidies' is not particularly well adapted to many parts of the invasives issue.[128] In some targeted activities, however, it can be of value. One example is found in the context of subsidies that encourage nurseries to produce and market native and long-adapted species, thereby making such plants more attractive financially for use in landscaping and as ground cover.[129]

Similar provisions in some countries, recommend or encourage private persons to use designated species for ornamental, forest, and other uses.[130] These provisions are particularly directed to invasiveness issues. Because they are designed to apply in a blanket fashion to private action, and apply to all non-native species, however, these provisions are generally non-mandatory, stated as recommendations or suggestions rather than requirements. In some cases, these provisions are supported by various kinds of compulsion, including the need to get permission before using non-recommended species (and no such requirement with regard to the recommended list.)

'Open season'

One tool that sometimes provides an incentive for control of invasive species is the adoption of a list of species that can be hunted, or even to pay a bounty on each listed specimen. In some cases, where ungulates, primates, fish and other species have commercial value, these provisions can ultimately backfire, as the hunters take measures to increase wild populations, in order to maintain their source of supply.[131] As with other measures, the concept of individual hunting as a means of control must be utilised with care, recognising several kinds of risks, especially—

- that over-hunting of an alien species may impact native species, and
- that many hunting methods have non-selective impacts on ecosystems and other species.[132]

[128] For example, Shine, et al, 2000, at 76, suggest payments to landowners and others for eradication on their land (a practice of value only where incurrence of a greater cost is imminent or ongoing for that species' eradication process); tax reductions for eradication (commercially relevant only where the value of the reduction exceeds the added cost of the practice—beyond what the taxpayer would do for himself anyway), and 'cross-compliance mechanisms' (apparently referring to the creation of a linkage between invasives eradication and grant/subsidy payments. This latter approach may be problematic in developed countries in which strong social purposes must exist before a grant/subsidy program is instituted. Tying an expensive or difficult additional action to the process might eliminate the incentive for landowners, farmers, etc., to participate in the subsidy programme. Hence, this approach is generally not a way to use a subsidy created for another purpose as an incentive to eradicate aliens. Direct subsidies tied to invasives and weed removal, including agricultural subsidies conditioned on the removal of agricultural weeds, may be very effective if they are applied broadly throughout an affected region. SOUTH AFRICA, Conservation of Agricultural Resources Act of 1983.)

[129] Baldacchino, *et al*., 1996.

[130] UNITED STATES, Regulations under the Surface Mining and Reclamation Act, 30 CFR 715.20(b), 816. 111.(b)(5) (specific governmental approval required where non-native species are being used in required minesite restoration activities); In BELGIUM (Walloon), per Lambinon, 1997, the government has adopted lists of plant species that are recommended for use in agro-environmental contexts, and supports these with subsidies in some cases. A 1995 Conference of EU countries included a recommendation regarding using native species for habitat creation and reconstruction activities. (First European Conference for the Conservation of Wild Flora, Planta Europaea, 1995, cited in Shine, et al. 2000.)

[131] Corn, *et al.* 1999 (concerns about the impact of open season on Chinese mitten crabs (an alien species found in California waters.)

[132] These concerns are reflected in the Bern Convention's *Recommendations for the Eradication of Non-native Terrestrial Vertebrates* T-PVS (2000) 65 Revised 2.

In this connection, as noted above, there can be confounding factors, such as activists who oppose the hunting or other destruction of the invasive species for humane or other reasons.

Connected to this mechanism are programmes for the commercial use of invasives, such as Southern African programmes which use invasive aquatic plants in local furniture-making and weaving.[133] To some extent, these programs take the view that if the species cannot be eradicated, at least it can be used—a process that contributes to population control, as well as replacing some of the livelihood contribution lost as a result of the invasion.

Regulating Government Action and Procurement

Stronger compulsion may apply to actions of government, including everything from species and/or ecosystem recovery programmes to landscaping of government facilities. For obvious reasons, many countries include provisions mandating the use of native species in ecosystem recovery programmes, and requiring particular findings and processes before any variation from these requirements can be allowed.[134]

One factor that is sometimes overlooked is the need to examine the environmental and other consequences of governmental plans for reintroduction and reforestation/revegetation. Primarily, this examination should consider the natural and human history both of the site and of the species on it. Thus, for example, plans to afforest a given area should generally not be implemented simply because the area is sparsely covered. There are many areas which have not been forested, and which contain biological and other resources that should be protected against a major attempt to change habitat type.[135]

In addition, however, species "reintroduction" projects, particularly where the species has not been present for a considerable time, apparently present special concerns. One concern, particularly where the species is generally considered to be threatened or endangered, is the possibility that the factors which caused its disappearance from the area have not been resolved.[136] In addition, it has been noted that even 'near relatives' of a local species may be sufficiently different to become invasive when introduced as a replacement for that species,[137] suggesting the need for extreme care and monitoring of introductions of any other species.[138] Finally, as with any movement of goods or materials into an area, the possibility of hitchhikers on or in introduced plants, animals, fungi and other organisms is addressed through provisions which call for quarantine or testing of specimens intended for introduction.[139]

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[133] IUCN-ROSA, 2004.

[134] See, e.g., SWITZERLAND, Regulations of the Commission for the Conservation of Wild Plants, 1994 (standards for the production and use of seeds and plants suited to local conditions (a determination based in part on local origin of the species, recommending the use of seeds sourced from within a 20 km radius of the proposed use) for restoration and similar purposes); HUNGARY, Nature Conservation Act of 1996 (preference for native tree species in reafforestation programmes); UNITED STATES, Executive Order 13112 of 1999 (use of native species in restoration of ecosystems that have been invaded). NEW ZEALAND and SOUTH AFRICA also reportedly have policy documents strongly encouraging a preference for native species in restoration and revegetation schemes. (Cited in Shine, *et al.* 2000, at 80.)

[135] See Young, 1994–1995 (Cyprus) (describing an unfulfilled afforestation plan to plant trees on an important geological structure (chalk hills) of esthetic and geological importance.)

[136] De Klemm, 1996.

[137] Schei, 1996

[138] GERMANY (federal) Nature Conservation Act of 1987, Chapter 5 at § 20 permitting only 'the installation of animals and plants of displaced wild species in appropriate biotopes within their natural area of occurrence' (translated in Shine, et al., at 79)

[139] CUBA Regulaciones sobre la Diversidad Biológica (Gaceta Oficiál 631/1996) 28 Nov. 1996, but also in most laws that include or focus on phytosanitary issues.

Controls on Incidental, Small and Unintentional Introductions

Direct controls, as described above, are most effective where, and to the extent that, the individual or entity introducing or controlling the specimens is know to government and participating in the control process. They are virtually un-applicable where this person/entity is not cooperating, whether

- because he is unaware of the requirement,
- because he does not feel that his small violation will be harmful, or
- he simply does not care but feels confident that he will not be caught.

While measures such as public awareness raising are very important in this context, so long as compliance with the law will cost money, incur delay, or require significant additional effort, smaller and unintentional introducers will continue to have an incentive to avoid compliance wherever possible, particularly since they can be relatively certain not to be caught (and if caught can usually avoid or minimise consequences by claiming that they did not know of the law and/or did not recall the small amount of biological material involved.)

As an initial matter, governmental controls can do little to increase awareness, beyond mandating certain activities by the commercial enterprises that rely on consumer trade in alien species (discussed below). The legislative power to intercept invasive species at borders is particularly difficult, with regard to small and unintentional imports in luggage or other containers. At present, such controls are adopted as the only available option, with the relatively unsatisfactory objective of increasing whatever chance exists of apprehending small quantity entry. Such controls are sometimes imposed more intensively, in response to particular urgent threats.[140]

There may be situations in which border controls may support efforts to inform and regulate non-commercial introductions. Primarily, such control may be increased by requiring commercial importers of alien species to retain some level of responsibility for subsequent use of those species by retail purchasers and others.[141]

Oversight/monitoring and Indicators

The third challenge is long-term in nature. The objective of oversight and monitoring of introduced specimens and their progeny addresses essential issues of awareness in both regulatory and private circles. The scientific and administrative processes described above for identifying and controlling species will never be perfect. Some past introductions have not yet demonstrated their invasive characteristics in their new surroundings. Scientific understanding is still evolving, and administrative controls depend to a large extent on the awareness and support of the regulated public. It will be necessary to assume that some invasive species will 'slip through the cracks.' To address these oversights or impacts, one must first be aware of them. Consequently, both a mechanism and a mandate for continuous monitoring will be essential.

This factor again underscores the difference between the governance of intentional and unin-

[140] For example, many European and North American airports currently impose very strict luggage search requirements on all passengers owing to fears of the spread of 'bird flu' through the importation of uncooked poultry products. It is generally expected that these measures will cease at some point when the threat of bird flu is either diminished or so general that controls no longer appear valuable.

[141] Although controls could be imposed upon resale within the country, the policing of all such transactions is virtually impossible.

tentional introductions. If all introductions were intentional and obtained and complied with their permits, oversight might be a relatively manageable task, and could be directed solely at the introducers. However, given the number of unintentional introductions, and those which (intentional or not) are unknown to any responsible governmental agency, the monitoring process must probably focus much more broadly, on geographically remote areas, including agricultural and 'wild' lands and waters.

Intentional Introductions

As with any permit system, it is common for invasive species legislation to try to place at least some of the responsibility related to the introduction on the user/introducer himself. Consequently, many kinds of permits for species introductions require the introducer to monitor his own and surrounding lands for indicators of invasiveness, and in some cases to identify and destroy seedlings or young of the introduced plant, when they are found outside of the introduction area.[142] These provisions typically increase in intensity, where the situation requires stricter controls, and particularly where the species is clearly not present through any other pathway. Hence, for example, the responsibility of an introducer with permission to transport/cultivate GMOs in strict containment, typically includes very strict duties to monitor outside the containment, and strict liability for specimens found outside the containment.[143]

These requirements do not eliminate the need for governmental monitoring, however. It remains essential to ensure that any deficiencies in government oversight, as well as the introducer's technical or other errors, do not result in harm to the country. It is also essential to address the possibility that some species which has been labelled as non-invasive and freely introduced might later prove to be harmful.[144] At a minimum, it will be necessary to ensure that the introducer is complying with permit requirements.[145]

These monitoring responsibilities are particularly dependent upon a relatively precise knowledge of the locations in which species are introduced. Of course, the government's oversight must necessarily include watchfulness covering the entire country, however, the specialised attention to intentional introductions can be much better targeted where the locations of the introduction and use are precisely known. Oversight regarding introduction on a particular parcel or facility is clearly simpler and less expensive that the broader oversight needed where the scope of the introduction permit extends to an entire district or province. For this reason, invasives oversight is frequently linked to regulatory provisions that require registra-

[142] ARGENTINA, Resolution 376/97; NEW ZEALAND Hazardous Substance and Noxious Organisms Act of 1996, at § 13

[143] See, e.g., CUBA, Decreto Ley No. 190 de la Seguridad Biologica, 1999.

[144] Shine, et al. 2000, at 68, state that Argentina does not allow this kind of monitoring unless a species has been identified as harmful, however, this statement may not take into account various other governmental authorities which broadly allow government to monitor the state of agricultural, forest, protected and other lands and waters, and to address perceived threats and risks.

[145] Governmental responsibilities must be broad enough to encompass oversight/monitoring of species introduced with permission or declared non-invasive. *See, e.g.,* TAIWAN Wildlife Conservation Law of 1989 at § 27 (government monitoring where any animal species have been introduced). A number of laws target these responsibilities toward particular lands or particular biomes. AUSTRALIA, for example, reportedly applies such responsibilities to the Torres Strait, to monitor movement of species from New Guinea (Shine, et al, citing another report). See also UNITED STATES (Hawaii) HI Revised Statutes, §§152–6, formal survey of 'pristine' areas required to guard against infestations of specified 'noxious weeds.' Other States have obligations to undertake regular surveys of specified ecosystems, waterways, etc., as well (listed in Shine, *et al.* 2000 at 68.

tion or other government notice of the places in which non-native species are introduced, used, kept or contained.[146]

Unintentional and Illegal Introductions

As noted in detail throughout this Part and Part IV, a significant group of pathways exist which are not easily addressed by legislation—that is, while it is easy to address them on paper, the impact of the legislation will not be notable, and will not achieve the stated objective of reducing and controlling invasive species. These pathways are generally referred to as 'unintentional and illegal introductions' and involving the actions of a broad swath of the population, including

- Persons who are not aware of the issue of invasive species or the legal limits on species introductions;
- Persons who are not aware that their actions (and the specimens they own or dispose of) are included within those laws;
- Persons and entities whose actions and level of involvement with invasives is relatively small (small agriculturalists, researchers, gardeners and others) and who discount its impact, and assume that they need not make the effort of complying with permit requirements and other restrictions; and
- Persons who, while attempting to comply, do not possess the technical ability or appropriate equipment and experience to comply fully.

The oversight and monitoring of these pathways cannot generally be expected of the introducers themselves, at least not with any anticipation of significant compliance. Few if any individuals engaging in this activity will normally be aware of indicators that a species is exhibiting invasive characteristics or establishing itself within the uncontrolled environment, nor will they be aware of any need to address these concerns. It is further unlikely that they will have the technical or physical ability to undertake such monitoring.[147] As a consequence, governmental surveillance must form the first line of responsibility for oversight of informal and unintentional pathways.

In addition, however, it is noted that certain commercial sectors exist primarily for the purpose of supporting the importation of exotic plants and animals, whether as pets, ornamental plants, or even small-quantity seeds and seedlings for gardeners and small farmers. It may be appropriate to impose some level of national oversight responsibility on these commercial enterprises, in addition to responsibility to build awareness in their customers regarding invasives.

Invasives in EIA—Prevention of 'Further Spread'

The environmental impact assessment process is another mechanism for addressing oversight responsibility. Where the law enables control and/or approval of new or extended activities, an EIA should include consideration the possibility of introduction, or especially of further spread of invasive species already introduced, as a possible environmental impact of that activity. The possibility that development activities will create an inroad for entrenching invasives is clearly an environmental risk of the type EIA

[146] *See, e.g.,* BRAZIL Portaria n° 108-N (6 Oct. 1991) (registration process for exotic animals.)

[147] Often, species look significantly different to the untrained eye at various stages in their life cycle, or when found in naturalised situations as compared with their appearance in cultivation or captivity.

is intended to address. Realistic assessment of this possible impact, and the imposition of effective control and mitigation measures can be a major element of invasives control. This factor is already well recognised in some developed countries, where the concept of addressing invasives issues in EIA processes has been rather thoroughly canvassed in litigation.[148]

Government Empowerment and Obligations: Enforcement and Remedial Action

The fourth regulatory challenge is the need to empower government to take action when an invasion or a potential invasion is detected. This element includes both legal and political aspects which sometimes have a far greater impact than any legislative or enforcement activities. In addition, it includes significant elements of the concept known as "due process" in many countries—that is the right of individuals and entities to be secure in their ownership rights. As a consequence of this issue, it is necessary for governments to state clearly the nature of each person's financial responsibility for damages caused by the species he introduces or allows to spread onto his property, including rights of government and responsibilities of individuals for containment or eradication of species that are found to be harmful and invasive. Another issue to be considered is the role of compensation of landholders, agriculturalists and others who have acted within the law, but whose crops or lands must be used, confiscated or destroyed in order to eliminate an existing or threatened invasion by a harmful species. These principles are generally well understood in existing national law, although there are certain aspects of invasive species that may necessitate the use of innovative approaches to them.

In this connection, it is important to keep in mind the difficulty and costs involved in reactive approaches to invasives. Most of the literature on invasive species is focused on the difficulty in finding effective eradication or control techniques, documenting the effectiveness of such activities or describing the costs expended in these processes, and comparing it to the financial damage caused by the invasive species. A typical example of the latter is as follows (looking at an ongoing eradication programme for the coypu, an invasive rodent in Italy):

> *In the year 2000, damage to crops compensated by public administrations reached almost € 300,000 and costs caused directly [by coypus] exceeded € 1,500,000. In 2000, Italy spent over € 3,500,000 for compensating or remedying damage caused by the rodents and for controlling the species in order to mitigate these impacts. Over 60,000 coypus were killed in trying to control their population. The total costs suffered during the 6 years covered by the survey (over € 14 million) has already exceeded the cost of the (successful) 11-year-long eradication effort in East Anglia (€ 5 million), which was considered very expensive at the time. Furthermore, since the Italian habitat area that is suitable for the coypu is around 3 times wider than the present range, it is very likely that the ongoing expansion will cause an increase of economic losses up to € 9–12 million per year in the future.*[149]

These discussions provide two practical lessons. First, obviously, eradication/mitigation is both difficult and expensive, leading some commentators to express a preference, in some cases an absolute mandate for prevention of

[148] *See, e.g.,* Palila v. Hawaii Department of Land and Natural Resources, 852 Fed Rptr 2d 1106 (9th Cir. 1988); Anglers of the Au Sable v. US Forest Service, 2005 WL 3334981 (E.D. Mich. 2005); Northwest Environmental Advocates v. US EPA (N.D., Cal. 2005) representing a fairly random sampling of such cases.

[149] Panzacchi, et al., 2003.

introductions. Perhaps more important, such measures are most likely to be prioritised where there is a significant current financial impact of the invasive species or a strongly and generally held perception of the need to eradicate it. This combination is far from common. Even where invasive-caused damage is widespread, it is more likely to be perceived as a business problem (in agricultural situations) to be addressed by each agricultural landowner with a combination of pesticides and other measures. This focused approach may not eliminate the wider impact of the species on other elements of the national economy and environment, and may also cause unplanned negative impacts on other ecosystems, species, or government objectives. In brief, this challenge demonstrates several primary points—

- that, regardless of the contents of relevant legislation, enforcement is ineffective without political/social support at all levels—an issue that law reform alone cannot address;
- that compliance, rather than compulsion, is a far more essential component of regulatory success, although more difficult to engender and measure;
- that compulsion-based provisions must be designed to form a mechanically exact system that gives certainty to both government and regulated persons, as well as to the judiciary and others; and
- that invasives issues and impacts are frequently not recognised for what they are—a fact that may inhibit compliance even where appropriate levels of public concern have been generated.

The following discussion briefly summarises five elements of the legal/policy framework that relate to enforcement, noting particular needs and examples of efforts to address them.

Political and Social Mandate

As an initial, cautionary point, it is important to keep an appropriate perspective regarding the value and impact of legislative provisions for the enforcement and remediation of invasives issues. Although comprehensive studies of invasives governance and its impact have not yet been undertaken, studies in closely related fields provide some useful lessons regarding the importance of political/social factors, and the inability of legislative systems to address them. Most importantly, the consequences of the lack of political/social support in the context of sustainability and natural resource law has been well demonstrated by a number of studies. To illustrate the point, this section summarises a recent study of the enforcement of wildlife trade (CITES implementation) law in the Member States of the European Union.[150]

As originally postulated, that study was based on the belief that low penalty levels stated in national wildlife trade legislation were fostering illegal wildlife trade (smuggling of endangered and threatened species), because the potential risks and costs to the violator were lower than the risks and costs of many legal business enterprises. The study set out to prove that increases in penalties and the development of guidance documents assisting judges in setting penalty amounts would raise the risk/cost to the smuggler, and lead to a consequent decrease in illegal wildlife trade.

The study's results, however, were quite different. Legal analysis showed that legislation addressing violation and imposing penalties

[150] Anton, M., N. Draggfy, et al., 2002.

was partially deficient in only one of the 15 then-Members of the EU (Portugal). Substantive analysis of apprehension and enforcement of wildlife trade smugglers, although not as rigorous or comprehensive as the legal analysis, clearly demonstrated that judges (and administrative authorities, where so authorised) had almost never penalised convicted wildlife smugglers at even 50% of the penalty level authorised by law (and in most cases, the penalties did not rise to the level of the actual profit the smuggler would have had on the specimens confiscated at the time of apprehension.) Consequently, enforcement provisions in wildlife trade legislation had less commercial impact on smugglers than the fees for obtaining a business license would have done.

Deeper enquiry into this judicial reticence demonstrated that judges (even those not subject to regular re-election or public recall) were strongly swayed by public opinion. In one case, a judge who had imposed a relatively severe penalty on a particular smuggler had been markedly influenced by a recent spate of documentaries on local television regarding the importance of ecosystem preservation and the impact of illegal harvesting of wildlife on the future of the planet. The high penalty was a subject of strong and generally negative press attention, counterbalancing the positive impact of the documentaries on judicial awareness and suggesting that his future decisions might be more moderate. Public opinion at the time of a criminal case involving wildlife smuggling was found to be overwhelmingly focused on personal human issues (sympathy for the defendant and claims that his life was worth less to the legal system than that of a captive parrot.) The fact that the crime involved is the attempt to sell an animal or plant (an activity that can sound innocuous), coupled with penalties amounting to thousands of dollars appeared unfair to many, when presented without the explanatory context regarding potential destruction of ecosystems and future human wellbeing.

Nascent efforts in some countries to develop judicial guidelines, too, were found to be of limited value. By definition, such guidelines may not be rigorously imposed against the judge's wishes, and in many countries even the existence of such guidelines is illegal, based on the possibility that it might be seen to impair the judge's 'judicial independence.'

Inevitably, the study's primary recommendation was the unavoidable one—that awareness-raising is essential. Such efforts must be targeted both narrowly (to the judiciary and other decision-makers) and more generally, recognising that 'public opinion' has a much stronger and usually sub-conscious impact on final judicial decisions regarding penalties and enforcement.

A useful secondary recommendation, however, related to the targeting of the penalty/enforcement provisions themselves. One country under that study (Denmark) had found particular success in the enforcement of provisions directed not at the smugglers themselves, but at those whose business activities frequently utilised illegally obtained wildlife—taxidermists. The incidence of illegal capture or importation of wild mammals and birds had been preliminarily found to have decreased through the imposition of such controls. The explanation for this result is relatively clear—while smugglers' activities are difficult to apprehend, document, prove, and obtain judgement on, those of public businesses with commercial licenses are relatively easily overseen. Moreover, such businesses have an interest in avoiding even relatively low-level fines penalties, affect their reputations, as well as their profits.

Compulsion

The final finding mentioned in the prior section underscores the more general statement above, that compliance has a much greater impact on the achievement of legislative objectives than compulsion. It is simply not possible to police all pathways (human activities causing species introductions) and the relatively low percentage chance of apprehension is generally not a deterrent unless it is financially significant in comparison with the costs or delays avoided by non-compliance.

It is relatively difficult to address compliance issues with any degree of certainty, or even to provide a reliable measure of it, however. Recent analysis in the United States, seeking to determine levels of compliance noted that in most cases the indicator evaluated is levels of enforcement activity.[151] Unfortunately, such an indicator is completely imprecise. Higher levels of enforcement may indicate either increased non-compliance (creating a larger number of violators to apprehend) or enhanced attention to enforcement (apprehending a larger percentage of a fixed pool of violators.) As with the CITES example of the preceding section, compliance can be encouraged through enforcement, but only where that legislative penalties are targeted toward controllable activities and sectors or communities with commercial or other incentive to comply.

Compulsion thus remains an essential part of enforcement legislation. As in all legislative frameworks, regulatory prohibitions are most effective where they apply to very specific 'choke points' through which most or all of the regulated sector must pass. In the context of invasives and alien species introductions, the most obvious choke point is the border crossing through which a species enters the country. While many countries identify this as a primary point of enforcement,[152] there are several deficiencies in this approach, including

- the existing demands on border officials, limitations in border stations as filters of unreported material, and the porous nature of many borders;
- the fact that border controls operate only at a macro level, and cannot control the intranational introduction of nationally present species that are alien to an ecosystem;
- the fact that species introductions do not happen at the time of border crossing but at some later period. In the interim, the species may have been multiplied, sold, traded, modified and otherwise dispersed in ways unknown to government officials and uncontrolled by the border control activities.

These deficiencies suggest the need to supplement border controls with other compliance mechanisms, including positive incentives (discussed below). The measures most frequently adopted to ensure or motivate compliance are those which generically assign civil and financial responsibility to any landowner or other actor who introduces a species. These provisions present difficulties in operation because of the evidentiary problems. It is nearly impossible, for example, to prove a particular individual or organisation introduced a species, or to prove that the species was invasive, that the introduction was in violation of the law, and that the introducer knew or should have known that his action was in violation and/or would cause harm.

[151] USEPA, 1994.

[152] *Documented in.,* Council of Europe "European Strategy on Invasive Alien Species" Doc. T-PVS (2003)

Other control measures may be pathway-specific—identifying markets, impacts and activities that can be objectively discerned, and that may be particularly susceptible to regulatory control or certification provisions.

Direct Action by Government

Not all legislative compliance issues relating to invasives are focused on permits and private action. Some of the most important components of invasives control involve the control of ecosystems, including measures aimed at preventing or controlling the spread of species, eradication of invasives found to be causing or threatening damage within the country, and other key actions (remediation, and ecosystem rehabilitation), while the contents of these measures is often intended as the empowerment of remedial action (discussed below), they serve two other purposes, as well. First, they may constitute a mandate upon government to protect landholders and other interest holders from harms of invasive species.[153] Second, they may also mandate the enforcement of limitations on private action. Thus, if a governmental agency does not take measures to prevent or control private introductions that spread invasive species, legal action against the government may be authorised, even before the decision actually causes harm.

Legislative mandates of government action are typically designed to take national budgetary and other priorities into account, calling for actions to the extent of available funds or within agency priorities. More definitively, such provisions often call for the creation of species and ecosystem recovery plans and other actions to enable (intergovernmental as well as public-private) collaboration to achieve invasives controls.

One of the most difficult elements to be addressed in legislation mandating government action is the possibility that other legislation mandates or supports alternative principles or actions that may directly conflict with the objectives of invasives control. For example, laws mandating direct government remedial action are considered very important, because they enable action on private property, which would be impossible for non-governmental actors without the permission of the relevant landowner. However, a variety of other laws may protect the landowner's rights, including provisions specifically permitting or mandating species introductions for sectoral purposes (agriculture, aquaculture, etc.)

User/introducer Liability

Environmental provisions are generally subject to a concept that the 'user pays'—*i.e.*, that the person whose actions cause harm to common resources (or obtains individual benefits from them) should be responsible for reimbursing not only the value of the resources taken, but also the costs of control and oversight of those resources and uses. Some elements of this process are purely financial—shifting the costs of permit systems to the permit holders, for example, as discussed in part F below. However, the equitable concept that one who individualises a benefit from sovereign or national property also affects the nature of enforcement actions, also applies. This would suggest, for example, that penalty amounts should be calculated in consideration of factors such as the costs of remediation and the value of the resources lost, both as commodities and as part of important or protected ecosystems.

[153] Such rights apparently exist in ITALY, based on the description cited at Note 151 and accompanying text, they are specifically mandated in invasives context in ICELAND The Nature Conservation Act (No. 44/1999) 22 March 1999, Art. 77.

In this connection, user-pays concepts enhance, but are not specifically made part of, standard approaches to liability. As in all legal situations, liability provisions are generally either civil or criminal, with a primary (but not invariable) distinction between the two that

- civil penalties result in the payment of a sum of money to compensate the damages suffered by an individual, company or by the government or the country as a whole (in the case of sovereign property, governmentally controlled natural resources and other assets held for the benefit of all);

- criminal penalties result in payment of fines, and fees that may not be tied to the financial value of damage but which are usually paid to government, rather than to a victim or injured party.

The following discussion briefly summarises some of the liability factors that are more or less unique to invasive species laws and their implementation.

Civil Liability Provisions

Civil liability is typically founded either on the principle that a private user who consumes a jointly held resource, or whose activities cause harm to jointly (or privately) held resources, should pay for those resources, as if he had purchased them, and for any consequent harms or inconvenience to others caused by his personal use. In a very few countries, specific legislation has stated this kind of liability in the specific context of harms caused by invasive species.[154] In general, these provisions are unspecific about the nature of the harms that form the basis of liability (apart from the costs of remediation.) In some cases, however, direct damage from the actions of invasive species has been used as a basis for civil claims, including against government.[155]

The current practice in most countries, however, seems to rely on other laws which discuss harm from animals or from cultivation activities, and to laws relating to particular ecosystems, areas, species or activities of importance within the country or community. While perhaps satisfactory in the short run (while the legal framework for species introductions and invasiveness is being developed or refined), it is probably inadvisable to consider such provisions sufficient unto themselves.

For example, agricultural laws typically contain strong provisions regarding liability for harm caused by the escape of farm animals, and wildlife laws may contain similar provisions relating to other animals legally held only in containment.[156] Presumably, some of these provisions may provide a basis for civil action in the context of alien species as well as other contexts, however, these laws are often interpreted on the basis of (and limited by) their statutory mandate. The context of the law may thus limit the kinds of damage or harm that may be compensated. Unlike the standard concern with regard to agricultural 'escapees,' for example, alien invasive species create a risk of longer term impacts, future harm and the need for conservation-oriented monitoring. The effects on these objectives may not be compensable if liability action is based on existing law.

Protected areas laws, and other conservation laws may provide a similarly limited basis for civil liability, which may apply to invasive

[154] POLAND, Civil Code of 1964, as amended; Environmental Protection Act of 1980, as amended. (The latter also authorizes individual and NGOs to seek civil remedies through administrative processes, as well as through the courts.)

[155] Cited in notes 150 and 155 above.

[156] Western Australia, Animal Control Act, altering the burden of proof in cases against one whose captive animal escapes from a vehicle.

species.[157] These provisions often recognise the intangible value of ecosystems and species over the long term, and thus may impose liability for all restoration costs, even where the commercial value of the particular harms are relatively low.[158] There may, however, be uncertainties for (government) claimants seeking to utilise these provisions to address damages caused by invasive species, where harms arise from human action far outside the protected area's boundaries and cause kinds of damage that were not directly considered at the time the legislation was adopted.

Hence, it will be necessary to review these laws carefully, and examine the fate of previous cases applying them, before concluding that they may be appropriate tools in the control of invasive species harms. It may not be necessary to adopt duplicative provisions in a separate 'invasive species law, however. Often a relatively simple amendment to existing environmental liability clauses may resolve these difficulties.

Criminal Liability Provisions

Although there are numerous instances in which invasive-species introductions can be bases of criminal liability under environmental laws,[159] most national laws imposing criminal responsibility relating to aliens focus on specific legal violations (e.g., the illegal cultivation of specific prohibited species.)[160] More general criminal laws, as well as national agricultural and safety laws may also provide bases for liability, where the user has a clear responsibility to impose safety measures for the protection of natural resources, private and common property, and health and wellbeing. Here also, however, it may be advisable to examine such provisions and consider whether minor amendments are possible and would be helpful in clarifying the application of these provisions to invasive species.

Causation and Specific Intent

In the context of both civil and criminal liability, invasive species laws raise two liability issues common to many of the most difficult and important environmental laws—the problems of proving causation (that the particular individual or entity is responsible) and specific intent (that the introducer knew or should have known of the consequences of his action, but acted anyway.) Although these issues are phrased in terms of common-law liability, they are generally relevant in other systems as well, where, for example, programmatic alterations in rights, in response to particular violations or conditions are not allowed where there is an insufficient basis for showing the legal justification for this action. These difficulties may be exacerbated where invasives liability claims are based on laws developed for other purposes. It may be difficult to prove the relevant components of a legal case (demonstration that a particular individual's act caused harm, and evidence of the harm itself, which may be prospective or scientifically complex.)

Where there may be several possible sources for an uncontrolled infestation of an invasives species, current scientific and legal theories offer little possibility of proving that a particular introducer was the actual source of the

[157] *See, e.g.,* HUNGARY, Nature Conservation Act of 1996; ECUADOR Expedir las Siguientes Normas Para la Instalacion y Funcionamiento de Granjas Avicolas en la Provincia De Galaapagos. (Resolución No. 034) 4 Oct. 2002.

[158] *Id.,* recognizing the "immaterial [viz, 'intangible'] costs resulting from the damage to natural conditions and quality."

[159] See, e.g., SOUTH AFRICA (Mpumalanga) Nature Conservation of 1968; ICELAND The Nature Conservation Act.

[160] Reportedly, there are French and Western Australian laws on these points (Shine, et al., 2000 at 82), although these do not appear to be environmental in focus, and the author has not been able to review all of the possible sources of these references.

problem. Some recent invasives liability provisions attempt to alter the necessary standards of proof,[161] but these provisions have not been legally tested. This approach to questions of responsibility and causation is more common where an activity is considered 'ultrahazardous,' and may ultimately not be available where it can be shown that normal precautions can be applied to prevent the harm. (In that case, private responsibility provisions will have to grow out of permit provisions, as discussed below.)

Applying Administrative Powers/ Impact on Commercial Rights

In the final analysis, a strong administrative system (when coupled with effective identification and approval mechanisms as discussed above) may constitute the most valuable elements of the enforcement regime relating to invasive species. These powers are quite varied, and may enable a variety of flexible and compelling actions by government to promote and enforce compliance with invasives and species introduction laws.

The most obvious administrative power applicable to species introduction laws are those relating to the enforcement of the conditions of new species introduction permits. Such permits usually authorise direct governmental action to enforce compliance, including entry and inspection of private property and records. They may also require permit holders to report the movement or use of particular species, the results of monitoring and other information.

Beyond these actions, the application of other administrative powers can have a significant impact both as governmental enforcement and as an incentive, in many types of intentional/commercial introductions, including permission

- to engage in commercial activities (business licenses);
- to market products, produce or other commodities (marketing authorities);
- to operate business or other facilities (environmental permits and licenses, authorisation to employ workers, and other permits); and
- to engage in research or development practices (for example, permits and tax benefits for R&D, as well as permits for the use of resources, including genetic resources).

Administrative powers may include the ability to suspend or revoke permits to affect the availability of tax benefits and other incentives, and generally to impact the commercial value of compliance with species introduction requirements, as well as recommendations, plans and priorities relating to species eradication and site remediation—activities which may not be legal obligations under the invasives legal regime.

Financial Provisions

Perhaps the greatest challenge of all, legislatively and politically, relates to the funding of regulatory systems and efforts to address invasive species. As noted above, the costs of control of existing invasives can be staggering. Among national priorities, however, few countries identify either agricultural or conservation/environment issues among their strongest national objectives. The financial challenge of invasives typically involves a combination of seeking greater allocations of existing funding (typically through targeted awareness-raising at highest

[161] *See* SOUTH AFRICA Draft Water Legislation circulated in 2001.

government levels) and finding new sources of funds to address these objectives.

Governmental Fundraising: Budgeting, Levies and Fees

In general, proposals for funding and for legislative measures to ensure the continuity of funding tend to omit mention of several key aspects which provide a strong limitation on funding efforts. The following are the primary funding mechanisms that have been proposed or are being used in efforts to address invasive species, including a brief analysis of the strengths and weaknesses of each:

Government subvention: Obviously, the first source of funds is direct government subvention. Typically, however, this is a relatively undependable source of funding, particularly for environmental and agricultural activities. Legislation to strengthen the central government's responsibility to fund programmes on an annual basis usually encounters one of two primary problems—either it is highly controversial and impedes or prevents passage of the legislation (where such provisions will be strictly interpreted and enforced) or it is loosely interpreted as recommendatory language that can be ignored (or supplanted) by the government in dealing with the exigencies of its budgeting and financial processes.

External (donor) funding: This option, while it cannot be expected to permanently fund ongoing activities, may be a means by which developing countries can fund the development of capacity, creation and realisation of legislative frameworks, negotiation of subregional programmes and agreements, and urgent programmes to address critical existing invasives threats and to halt ongoing damage. In a few cases, particularly where protected areas are involved, external NGOs and other bodies may be willing to undertake invasives control measures as part of a broader license to operate protected areas or take other actions.

Application fees: Application fees offer another mechanism for increasing agency funding.[162] In many cases, however, there are legal provisions limiting the amount of application fees, requiring that they be reasonable in comparison with the costs of processing the application. This may be a relatively large sum, given the need in many countries for a scientifically conducted risk assessment, however, it will not provide any basis for funding other governmental activities. Conversely, in many countries in which a higher rate may be charged, there is often a legal requirement that such fees be paid into a general fund, or otherwise may not be retained by the agency charged with invasives control responsibilities. ;

Levies based on pathways and other tax provisions: In several contexts, it may be relevant to impose a levy on species introducers in a generic way—that is, as a levy on certain activities (without the need to identify specific invasive species connections.)[163] Industries that are known to involve particularly high levels of uncontrolled species introductions (such as the importation of ornamental plants, aquarium fish, aquacultural systems, forest products, tourism, etc.) can be subjected to an additional assessment as part of the normal legal operation of the pathway.[164] Similarly, there are many situations in which new taxing mechanisms are proposed for purposes of increasing revenue for primary governmental services, including conservation

[162] *See, e.g.,* CHILE *Establece Normas De Ingreso De Material Biologico Y Deroga Resoluciones Que Indica* (24 Sept. 2001).

[163] *See, e.g.,* New Zealand, Biosecurity Act of 1993

[164] Young, T., 1994 (Zanzibar)

activities.[165] Tourism taxes and airport fees are often proposed with these goals in mind. In general, so long as the additional assessment is not large it will operate as a fund-raising provision, rather than a deterrent to otherwise legal action. One issue to be addressed in this process will be the fact that other ministries and regulatory systems may also feel justified in claiming some part of these funds.

Payment for environmental services and other existing fund mechanisms: Additional gloss on this approach can be found in the existence in some countries of environmental or agricultural 'fund' mechanisms, under which donor funding or other directly provided sums are placed in a trust fund or similar arrangement, as a way of ensuring that they are spent for particular purposes, commonly including protected areas or other environmental objectives, or specific poverty reduction and livelihood improvement programmes. Similarly, some suggestions have recently been voiced that invasives programmes in, for example, hydrological basins, might be funded out of programmes of 'payment for environmental services'—a concept by which those who obtain the benefit of environmental services (e.g., downstream water users who benefit from upstream efforts to prevent riparian erosion, conserve (and refrain from developing) forested areas that protect the ground and surface water systems etc.) must pay for those services. Both kinds of funds have been proposed as possible sources of funding for invasives programmes.

In attempting to utilise these mechanisms to address invasives issues, it will be necessary to examine the purposes for which the fund was set up. Before investing significant efforts in such a system, it is necessary to also remember that, real examples successful and consistent fund and PES mechanisms do not yet exist. Their ability to achieve the laudable objective of creating a stable source of funding for the conservation activities is still being investigated. Moreover, regardless of whether this concept can have any substantive value in practice,[166] it remains true that the queue for sharing in such payments is long and growing.[167] While many continue to assert that this is a means of financing protected areas, programmes such as rural development, poverty alleviation, and forest certification, for example, are increasingly joining in the call, suggesting that whatever funds may ultimately be generated in this way may not be sufficient to meet expectations.

It should be noted that some of these strategies are also thought of as enforcement mechanisms ("promoting accountability."[168]) This raises an important point. In general, studies have shown that legal provisions relating to the payment of fees, taxes, and levies can have only one primary purpose—either as a deterrent to some action (promote accountability) or as a measure to raise

[165] See, Young, T., 1994 (Zanzibar) expected 'tourist tax' cited by several different ministries and agencies as a source of funds to permanently address shortfalls.

[166] The primary questions regarding environmental funds and payment for environmental services are basically the same. In essence, these provisions constitute diversions of existing funding in a majority of instances (even donor funding is generally thought to be a single pool of funds, whose disposition is alterable, but whose amount typically remains relatively constant.) Hence, where needs of other non-environmental sectors are seen as higher priority, governmental decisions creating funds or arrangements may sometimes be revised or rescinded by government without violating any law, and generally without any real penalty. IUCN Environmental Law Centre, 2004.

[167] The utilization of 'Payments for environmental services' figures prominently in the planning of nearly every Sectoral Programme of Work under the Convention on Biological Diversity, and have probably been mentioned as options for every environmental, conservation and poverty relief program described in professional literature in the last 5 years. For an excellent discussion of this issue, see Pagiola, S., *Payment for Environmental Services,* (World Bank, 2005).

[168] *See, e.g.,* Shine, *et al.*, 2000, at 83–4.

funds. It is generally believed that a small tax or low percentage increase in an existing tax will operate to increase funds, whereas a larger tax or levy will primarily deter persons from taking the action associated with the charge.

Private Responsibility Provisions (The 'User Pays')

In addition to the direct need to fund government activities, and to enable governments to implement invasives controls and remediation, it is often appropriate to assess responsible individuals and companies for costs and damages, and to require them to undertake remedial action. In some instances, these provisions serve a dual purpose. On one hand they impose individual responsibility for commercially incurred invasives risks that result in damage or invasion. In addition, the knowledge of this possibility might deterr would-be introducers from taking such risks without sufficient financial or practical justification.

User pays approaches vary widely among countries. Some countries (those with strong market-based approaches to legislation and implementation) view "user pays" as, effectively, a kind of civil liability provision, by which a user is strongly encouraged (by its own commercial and financial imperatives) to prevent liability. Usually, his permit will state that he must bear the costs not only of the resources he uses directly, but of all unmitigated harms to other resources caused by that use. In order to avoid a later assessment of both penalty for the violation and costs of restoration of damaged resources (or value of irrevocably lost resources), he will obtain a permit and take the necessary actions. Other countries recognise 'user pays' as solely a cost distribution measure, calling for the permit administration processes and other related governmental operations to be paid through substantial fees assessed against those who seek permission to introduce a new species.

At a minimum, the user-pays concept provides a classic financial incentive. By liquidating and assessing the costs of each user's activities to the user himself, the attractiveness of those activities is also diminished. Hence, while these provisions may help reduce illegal behaviour, they are especially important as means of encouraging users not to take otherwise legal actions that are unsustainable or environmentally unsound.

Permits and costs

Legislative provisions assessing permit fees that more closely mirror the costs of permit review and oversight are not new and are used in the context of species introductions in much the same way as in other contexts.[169] One important factor to be addressed in this use, however, is the question of long-term oversight costs (and the possible need for reactive governmental response long after the introduction), where the permit is issued only once. These concerns may be the reason that some commentators have proposed bonding and other unwieldy and ineffective options to address user's responsibility for financial costs of invasives programmes (discussed below.)

Direct Responsibility for Remediation

Another key element of most similar permit systems is the permit-based responsibility to take immediate and effective remedial action. In the context of species introductions, these responsibilities include monitoring nearby lands and

[169] *See generally*, BRAZIL Portaria n° 28–N (9 July 1991) (recognizing that when commercial interests are involved in permit or other regulated activity, then the costs of extra governmental vigilance could rightly be charged to the company.)

waters for the presence of unintended shoots or seedlings of the introduced species, and to remove those that are found. To the extent that the invasion or its removal leaves an empty niche or causes other damage, the user will typically be required to remedy those damages as well.[170] One advantage or this approach is the ability to 'enhance' standard penalty provisions, by adding the direct responsibility to pay the costs of repair. In some instances, the alternative of paying the value of damaged resources is also available.

This option may in some cases be selected by the payer and in others be decided by law or by the relevant agencies. Where the choice rests with the payer, it amounts to a liability limitation, so that the remedy will not be required if the costs exceeds the value of the resources being restored. The method for determining the value of the lost resources will be a major determinant of the effective operation of that provision. If the commercial value only is considered, the amounts involved may sometimes be relatively low, and the option for avoiding restoration costs may be increased. If the environmental value is considered, the amounts may be correspondingly higher. On the other hand, if the determination is made by government, it may be more even-handedly applied.

Loss of Environmental Services

As discussed above, current political theories focus on the possibility that governments and communities can receive 'payment for environmental services' from forests, hydrological basins, and other natural resources. One financial innovation that has been proposed is based on a reverse of this concept. In South Africa, a specific proposal has been adopted which assesses a charge based on 'streamflow reduction' against the landowner, where an alien species on his land increases the natural use of ground or surface water.[171]

Insurance and bonding arrangements

Although insurance bonding arrangements have been proposed for use in species introduction situations,[172] there are several reasons to suppose that they will have a minimal ultimate impact, especially in developing countries. First, as a practical, commercial matter, such approaches are difficult to impose unless they take the form of a lump sum payment by the introducer into a trust account held by the government. Surety-based performance bonds are rigidly controlled insurance arrangements, usually very specifically tied to the particular factors of the particular action or condition being bonded. Consequently the creation of a new kind of performance bond might require new regulations, even changes in insurance law in some countries. In general, such a tool would only be proposed if a financially sound insurer was willing to provide such a bond. Given the potential costs of invasives remediation and the difficulties involved in prediction of invasiveness, reputable non-governmental insurers may find this an unprofitable offering.

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[170] For example, where the UNITED STATES government was maintaining a population of alien ungulates (including Mouflon sheep—considered a threatened or endangered species in their primary habitat) in Hawaii, and it was shown that these species were threatening one of the last habitats of the endemic (and highly endangered) Palila bird (*Loxioides bailleui,* formerly *Psittirostra balleui*), a federal court held that they were responsible for eradicating these species. Palila v Hawaii Department of Land and Resources, 852 Fed. 2d 1106 (1988).

[171] SOUTH AFRICA, Draft Water Act, 2003.

[172] Shine, *et al.*, 2000, at 84. Hungary and Argentina reportedly were proposing to require 'mandatory insurance' against certain activities including those that involve invasive species. *Id*. (although the author was not able to discern whether and how these provisions would be used in the invasive species context.).

Where a potential offeror exists, however, or where government proposes to serve as surety, there are examples in other environmental areas (such as surface mining, and hazardous waste disposal), that might prove instructive.[173] However, there are further concerns relative to their use in invasives. Substantively, surety bonds of this type are typically focused on a kind of performance that will happen by a specific date (*i.e.,* site restoration after mining activities have concluded), or where analytical testing can conclusively prove the absence of hazard as of the date that the bond-provider concludes the bonded activities. While this kind of situation might exist (such as in contained uses and controlled field trials), it will not apply to the majority of species introduction situations, where the risk being insured is the long-term risk that an introduced species will turn out to be a 'sleeper' demonstrating invasive qualities and causing damage many years after introduction.

Consequently, the requirement of surety bonding will have a limited applicability—

- where the introductions are intentional and subject to permit;
- where there are specific observable characteristics to serve as the basis of insurance, and a date certain on which they should be applied,
- where a surety or the government is interested in subsidising or supporting the particular activities being bonded.

Transboundary Cooperation

The final primary challenge—transboundary cooperation—also involves laws and legal principles that are generally already in existence in most countries. Invasive species issues place special demands on existing diplomatic and practical mechanisms, however, due to the urgency that may arise where a gap in border control or other activities is enabling introductions that may be difficult or impossible to track down and remedy.

This challenge embodies two components. First, it includes the need to develop and implement international agreements at various levels from bilateral to global (a matter that is predominantly outside the scope of national legislation), but also the frequently overlooked matter of authorising and empowering urgent response and implementation-level coordination across national boundaries.

Development/Implementation of International Instruments

International cooperation efforts at present appear to be moving from the general to the extremely specific. Most of the primary policy work appears to be complete, but essentially offers only the most generic of mandates. Thus, for example, the Council of Europe's long awaited strategy simply encourages countries (i) to develop national invasive species strategies, (ii) to cooperate with other countries, as appropriate, to prevent, mitigate, eradicate or contain invasive species, particularly through the sharing of information, and (iii) to keep the CoE's Standing Committee aware of measures taken in implementation of these mandates.[174] The vast majority of invasives-related international

[173] *See, e.g.,* UNITED STATES Surface Mining and Restoration Act, and Resource Conservation and Recovery Act. Particular commercial and legislative issues in the application of bonding provisions under these laws are discussed in Machlin, J., 1988 (updated.)

[174] COUNCIL of EUROPE "European Strategy on Invasive Alien Species" Doc. T-PVS(2003) at 7.

instruments adopted to date, do not impose or even recommend specific measures or any (mandatory or voluntary) provisions agreeing on the mechanisms for invasives control. At most these instruments demonstrate the breadth of international commitment to solution of the invasives issues currently of concern.

The most important recent work addresses particular groups of pathway-related invasives/invasions. In a few international instances (including the Ballast Water Convention, the International Commercial Aviation Organisation, the IPPC and FAO Codex) these processes focus on the development of standards and specific requirements. In the main, however, current trans-border work is happening subregionally or bilaterally between neighbouring countries or between trading partners. This bilateral work is often very specific, focusing on particular species (usually reacting to serious known invasives problems), or on pathways that are believed to be the primary highway by which those species (and others) are being introduced. These instruments typically provide a regulatory level of detail and can be relatively easily translated into laws, regulations and administrative practices.

For purposes of legal implementation of invasives objectives, some of the most important international negotiations, however, relate to the relationship between species controls and international trade law. These controversies are frequently phrased in terms of precaution focus on the intersection of the rights of importing states to protect against sanitary/phytosanitary hazards (on one hand) and of exporting states to be protected against inappropriate 'technical barriers to trade.'[175] These negotiations carry perhaps the primary lesson that international law offers drafters of invasive species legal frameworks—the importance of development and consistent international implementation of standards whose acceptance is sufficiently general among countries that it can withstand challenges in international trade tribunals.

Implementation-level Cooperation Across Boundaries

As noted above, the CBD-COP has called on parties to act 'individually or cooperatively,' once the establishment of an invasive species has been detected—taking appropriate steps 'such as eradication, containment and control, to mitigate adverse effects."[176] In many instances, instruments call for public notice requirements to be accompanied by notice to nearby countries, particularly where the notice relates to invasiveness discoveries, new species introductions, and similar problems.

Strictly domestic laws are also sometimes addressed at transboundary issues, such as the creation of special site monitoring provisions for border areas, to provide an indication of the possible spread of specimens across national borders.[177] This raises the possibility that government officials at ministerial and agency levels will need to interact closely and directly in order to respond to these risks.

While these problems are not unique to invasives control, they are frequently overlooked

[175] Cooney, R., *et al.,* 2004.

[176] CBD COP Decision VI/23 (UNEP/CBD/COP/6/23).

[177] AUSTRALIA, for example, reportedly applies such responsibilities to the Torres Strait, to monitor movement of species from New Guinea (Shine, et al, citing another report). The FAO Code of Conduct for Responsible Fisheries makes this point, by not only calling upon parties to notify and/or consult neighbouring states in connection with introductions for aquaculture, but also to select species, aquaculture sites and management techniques, 'with due respect to their neighbouring States

in legislative development.[178] Recent valuable discussions arising out of the short-lived trend of donor attention to the creation of 'transboundary protected areas' have recognised that attempts to address primary natural resource management activities that cross borders in the form of individualised formal agreements are frequently inefficient uses of government resources, in terms of

- the funding and manpower involved in those negotiations,
- the long time needed to complete diplomatic formalities for even the most minor of bilateral or international instrument,
- the necessary inflexibility of resulting instruments, so that alteration of those instruments in response to changed or discovered circumstances may be impossible or engender additional delays, and
- the necessity in such instruments to specify diplomatic pathways for actions considering, implementing or amending any part of the required performances.[179]

These discussions have inevitably resulted in a broader recognition that, although the creation of more formal instruments of cooperation is not typically expedient, the empowerment of less formal mechanisms, allowing natural resource management officials to coordinate their actions and mandates to achieve shared or mutually recognised objectives, is indeed urgently needed.

National legislation can contribute to this process, where the highest level parliamentary body[180] specifically authorises direct contact between focal points within national implementation-level agencies, including meetings and informal or institutional planning regarding species, ecosystem and other invasives-related planning.

In this area, the CBD Guiding Principles offer rather specific suggestions, noting that the provisions for transboundary cooperation should include "Programmes [rather than formal agreements] to share information on invasive alien species… and invasion pathways, with a particular emphasis on cooperation among neighbouring countries, between trading partners, and among countries with similar ecosystems and histories of invasion; [as well as]… cooperative research efforts and funding efforts toward the identification, prevention, early detection, monitoring and control of invasive alien species."[181]

[178] *See* Anton, M., 2002, for a discussion of the manner in which this same requirement has inhibited transnational implementation of wildlife trade controls, and the new legislative and conceptual developments being recommended as means to overcome these traditional/diplomatic impediments.

[179] InWeNT, *Proceedings of the International High-level Seminar on Transboundary Natural Resource Management* (Arusha Tanzania, 2003)

[180] *I.e.,* the national parliament in adopting a law, rather than a ministry or agency's inclusion of provisions in its regulations.

[181] CBD Decision VI–23, Guiding Principles, Principle 9(a) and (d).

4 Legislating Invasives Control—Challenges for Developing Countries

Up to this point, this paper has attempted to maintain a few primary differences in approach from the survey-style analyses currently available relating to invasive species and legislation. It has not attempted to parse legislation on a provision-by-provision approach or to find or assert superficial similarities between standard legislative approaches across a variety of countries. It assumes that its readers understand the function of primary provisions and seek to understand the basic operational differences that distinguish invasives legislative issues from other natural resource legislation. It has set out some of the scientific factors that impact the effectiveness of legislation relating to invasives, and lists some of the specific tools that may help address the specialised concerns of development of a legislative framework for the control of invasive species concerns.

This Part considers the process by which these facts and tools can be integrated into a framework for national legislation, with particular attention to particular application issues relevant in developing countries. Even here, however, it does not take a section-by-section approach,[182] but describes how a national or sectoral framework is built from the primary policy basis through the development of specific mechanisms and standards. This process, within any country, requires several tools at various levels of action. Specifically, such a framework must be based on

- Actions at the policy level (risk determinations, distribution of authority, and identification of a legislative strategy/approach);
- Application of overarching principles (precaution, polluter pays, ecosystem approach, participation/access to information, and risk/impact assessment); and
- Practical adoption of particular legislative tools.

This discussion does not attempt to provide a model for legislation, but rather to provide advice for the adoption and coordination of relevant legislation.

Primary (Policy) Decisions

The development of a national legal and administrative framework addressing invasives can be a highly complex matter, owing to many factors—from the distribution of admin-

[182] The author notes that section-by-section analysis varies greatly between countries, even when the particular provisions are facially similar. Moreover, section-by-section approaches tend to move through legislation from beginning to end, giving the false impression that this is the order in which issues should be addressed.

istrative authority under national law, to the level of decision-maker awareness of the full breadth of the invasives issue. Like any other legislative framework or regime, a policy/law framework for addressing invasive-species is effective where it encompasses seven key components:

(i) approval or endorsement of primary governance objectives, including the level and types of risk to be addressed, and those that are deemed acceptable;

(ii) selection of administrative mechanisms and/or approaches most suited to the technical problem and the particular government's implementation capacity;

(iii) authorisation and/or mandate for particular agencies, institutions and officials;

(iv) clear delineation of specific prohibitions, restrictions, permissions and obligations of entities within the country,

(v) development of a regulatory programme or plan for direct implementation of the mechanisms and authorisations selected;

(vi) communication of relevant facts to 'on-the-ground' officials and the regulated public, and

(vii) enforcement (protocols and procedures.)

Although all of these components are basically essential, the manner in which they are implemented varies greatly from country to country. For example, in many countries a formal 'policy' process addresses component (i) and at least part of (ii), and may also make the primary decisions in component (iii). In other countries, no separate policy is used, however, these matters are still essential foundations of the governmental framework, but are embodied in core components of primary legislation.

In virtually all countries, parts of components (ii) through (v) and part (vii) (and sometimes also part (vi)) are addressed through some combinations of primary and secondary legislation (variously known as 'laws,' 'acts,' 'statutes,' 'ordinances,' 'decrees,' 'regulations,' directives,' 'protocols,' 'rules,' 'by-laws,' 'guidelines'.) The distribution between primary legislation and other instruments, can make a tremendous difference and is very important to the framework structure. Unfortunately, however, these distribution matters (and their potential impacts) are primarily controlled by the overall structure of each individual country's governance system. Consequently, it is unproductive to make 'model' recommendations concerning these choices, which must be addressed on a case-by-case basis.

For these reasons, it is preferable to examine the interaction of the functional components of the system, rather than discussing separately the 'policy,' 'law' and 'regulations.' Seen in this way, the framework structural issues can be more easily examined. For example, regardless of how it is memorialised (in policy, in law, or in a decision not to adopt either), the first component will clearly have a central role in the formation of the rest of the framework. Particular where it clarifies the relationships and priorities among governmental objectives and interests, proclaims the level and nature of risk that can be thought 'acceptable' or 'unacceptable' in this respect, and assigns primary responsibility for various aspects of the issue, this first level of decision-making is both a critical element in its own right and a primary essential foundation for the others.

In this connection, this paper assumes that invasives controls will be expressed through a

variety of regulation systems.[183] Policy choices may be made separately for each such system, although, in the best case, all such decisions will be based on a central policy decision that might create some bases for integration of approaches.

Initial Policy Choices

While the scope of policy-level decisions and analysis can never be truly specified, the combination of the various factors described in this paper, suggest that the legal tools described in Part III can only be truly effective if implemented on the basis of clear and direct guidance on three primary policy points:

- Nature of primary approach (i.e., the choice of presumptions in addressing potential invasives issues);
- Level of risk that is 'acceptable'; and
- Distribution of responsibility for 'acceptable risks.'

These primary determinations form a basis for an overall system to be organised and on which the legislative or revision/integration process can go forward. Where possible, it may be preferable for government to make these decisions directly, on the basis of detailed analysis and deliberations. This may happen through the adoption of one or more formal policies, the development of an implementation or legislative strategy, or the adoption of one or more cross-cutting legislative instruments. It is recognised, however, that a much of a country's necessary legislation is proposed and/or adopted sectorally rather than waiting for such central decisions. In these instances, there is a greater chance that agencies will interpret their mandates in divergent ways, and that, as a result, various pathways will be regulated inconsistently, creating potential difficulties and inefficiencies where they or their impacts overlap.

Nature of primary approach

As in all legislative practice, there is great variation among countries with regard to the statement of objectives in national legislative/administrative frameworks. One somewhat unusual problem arises very frequently with regard to primary decision-making on invasives, however. Often, invasives policy and similar documents are relatively simple, enunciating a strong national policy in favour of the elimination of invasive species (or "harmful species"), and prevention of further introductions of such species. Such policy statements may sometimes be based on a narrow view of the invasives issue. The following quotation from a noted GMO expert exemplifies the issue:

> *"Although there are certainly links between IAS[184] and biosafety, the point is well made that IAS are all about risks with no benefits, while GMOs (genetically modified organisms) have perceived benefits."*[185]

While clearly demonstrating the reason that invasives policy is less controversial than GMO policies, this statement also indicates a serious

[183] A number of specific invasives laws examined in this paper were primarily sectoral in focus (*See, e.g.,* BRAZIL Portaria n° 28–N (9 July 1991) (Specific invasives control legislation limited in scope to plants and forest products.) Although some commentators have suggested that multiplicity of regulation should be avoided, the author recognises that the reasons for a multiple approach extend beyond the single factor of invasives integration. Hence this paper assumes such approaches in most cases, whether a single integrated law is developed or not.

[184] "Invasive Alien Species."

[185] Name withheld, the commenter is the head of a scientific institution researching in the field of gene technologies, and was commenting in an electronic discussion in the course of the GEF's global Evaluation of National Biosafety Framework Development Projects (2005).

underlying governance problem—invasive species are perceived and governed as if they are 'illegal' in themselves (something innately harmful is easily forbidden.) The speaker (and those who, like her, adopt this view of invasives controls) appear to limit the need to regulate the actions underlying the introduction of such species or the motivations of those actions. Perhaps, most important, however, they may overlook the primary practical reality of the invasives problem—the direct impact of an alien species (whether positive or negative) cannot be assumed, but must be specifically determined, whether by regulatory action or on a case-by-case basis.[186]

This perception (that regulation of invasives need only affect the introduction of species that are harmful) is widely held.[187] As a result, many existing national invasives policies do not consider the full range of national objectives and interests impacted by invasives-related legislation and implementation, nor do they address the need to assess the broad range of species introductions, in order to determine which require specific control measures. Although strongly promoting the idea of unified decision-making regarding invasives, the national strategy (or technical advice for development of invasives-related institutional frameworks) will not mention or recommend an analysis or stocktaking regarding relevant institutions and policies.[188] This is a major omission. No matter what kind of legislative system is ultimately developed, it will be essential that legislators and implementing agencies are aware of how each sector can be impacted by any controls designed to limit introduction of unassessed or unapproved species, or to place restrictions or liability on those whose actions result in such a species taking hold.

Clearly, in order to adopt an affirmative programme including prevention of introduction of invasives, and other control on alien species, a rather detailed policy analysis is clearly required. Such analysis must include an analysis of national policies, incentive, mandates and motivations underlying relevant pathways (human action), as well as an evaluation of national commitments under international instruments (including especially regional and sub-regional agreements and trade commitments) that may have relevance to invasives issues.

It is not difficult to identify the primary objectives of invasives legislative frameworks, although in many cases, it can be very difficult to reflect the full range of impacts and intergovernmental relationships. Thus, for example, many commentators suggest only environmental objectives (protection of biodiversity against a series of risks)[189], without noting the importance of development, commercial, agricultural and other objectives (e.g., to "promote safe introduction of commercial species for food security," "development of economic opportunity," etc.) These activities and their implementation can be both positive and negative factors in invasives decision-making, and can be both positively and negatively impacted by introduced species.

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[186] McNeely, et al., *Global Strategy on Invasive Species* (GISP, 2001) (stating that "every alien species needs to be managed as if it is potentially invasive, until convincing evidence indicates that it presents no such threat.")

[187] *See, e.g.,* UNITED STATES (Minnesota) Exotic Species Act, Minn. Stat. § 84D,01(7) (regulating only 'Harmful exotic species'—those non-native animal or aquatic plant species 'that *can naturalise* and either (1) causes … displacement of … native species in their natural communities; or (2) threaten natural resources …."), and UNITED STATES (Wisconsin) Aquatic Plants Law, Wis. Stat. § 23.24 (2)(b) (regulating 'Invasive aquatic plants', which refers to those that 'have the ability to cause significant adverse change to desirable aquatic habitat, to significantly displace desirable aquatic vegetation or to reduce the yield of products produced by aquaculture.)

[188] See, e.g., Shine, et al., *Guide to Designing Legal Frameworks on Alien Invasive Species,* chapter 4.

[189] See Shine, et al., at 4.4.1 (p. 43).

Accordingly, policy processes should attempt to regularise the relationships among various ministries and agencies charged with implementing sectoral objectives.

Acceptable Risk Levels

The underlying objectives of invasives species law revolve around a combination of addressing the risk of harm and ameliorating harms already caused. The balance between avoiding risks and reacting to damage where risks are not avoided is a primary determinant of how each component of the invasive species framework will function. Thus, for example, many systems (particularly in developed countries with limited remaining endemic species and protected ecosystems) focus on addressing known environmental risks.[190] Such systems operate primarily in a 'remediation-mode'—that is, their primary mandate is to react to harms that have been identified in fact. (See Box 3.) By contrast, the potential financial and social costs once invasives become established in an area prompt many countries, to prefer an approach based on avoiding (or at least balancing) risks, before specific harm can be caused.[191] The level of risk that is considered acceptable, whether on a sectoral basis or determined overall, depends on a variety of factors, including the country's financial and other ability to take remedial measures in the event that the risked invasion occurs, balanced against the social and economic value of the reasons behind the desire to introduce a species. In order to provide functional guidance, however, national and institutional objectives regarding invasives must be well understood and must provide some basis for addressing their direct impact on other sectoral objectives and concerns.

For developing countries, the risk acceptance issue is more difficult than for developed countries. On one hand, the risks of introductions may be greater in both financial and absolute value, given the importance of biodiversity to these countries. At the other side of the analysis, issues such as food security, poverty alleviation, and forest management are extremely serious in many developing countries, and often directly dependent on species introductions, whether as a consequence of donor insistence or for other reasons. Typically, a reactive approach will not be recommended, where the country lacks the ability to monitor changes in biodiversity and even in agricultural lands. In addition ecosystemic concerns indicate that it may be extremely expensive to undertake remedial activities once an invasive species has taken hold, and that the chance of successful eradication may be substantially reduced.[192]

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[190] *See, e.g.,* EUROPEAN UNION (in Council Regulation (EC) No 338/97 of 9 December 1996 on the protection of species of wild fauna and flora by regulating trade therein (Official Journal L 061 pp. 0001–0069) 03 Mar. 1997, (focusing on known invasives and situations in which harm has been demonstrated in fact). In the UNITED STATES, acceptable risk levels are not expressed in any absolute terms. The national invasives strategy focuses on harm and damage to property and commercial interests. Risks to biodiversity are not completely ignored, but are generally addressed through the Environmental Impact Assessment (EIA) process.

[191] BRAZIL Portaria n° 28–N (9 July 1991) (regarding introduction of plants and forest products, focuses on balancing commercial with environmental interests); SOUTH AFRICA Conservation of Agricultural Resources Act of 1983 (the sectoral law in the country containing the strongest provisions relating invasives control. This act, not surprisingly, embodies a high level of potential risk acceptance, recognising three categories of alien invasive plants (i) weeds (heavily regulated, as they are considered to pose a high level of risk, while providing no value), (ii) invader plants with ornamental value (relatively strongly regulated due to the lower social value of the plants), and (iii) invader plants with commercial value (which must be regulated in a way that does not deprive anyone of this value). This law focuses on agricultural and commercial impacts and contexts, in addressing the value/risk relationship.

[192] IUCN ROSA, 2004.

Distribution of Responsibility

Another policy element that must be decided in an integrated system is the manner in which responsibility for the 'acceptable risks' is distributed. In particular, it is necessary to consider who will bear the responsibility to compensate harm and remedy harmful conditions caused where a government decision has permitted species to be introduced (or other actions to be taken) which later prove to be harmful. In general, this decision involves a balance between government responsibility (based on the government's primary role in regulating and protecting against harm) and the responsibility of the introducer or other persons whose actions were involved. Often, distribution of responsibility questions are answered differently where the non-governmental persons involved are commercial entities, and where they are not.

Overall legal regime: Systemic components and approach

Perhaps the most frequently canvassed issue to date relating to invasive species legislation relates to the manner in which legislation and implementing processes are developed, with particular attention to whether a unitary (central) or sectoral (distributed) approach is best with regard to the legislative structure of each country's framework.[193] A few points regarding this issue are thus merited, in order to achieve the objectives of this paper.

Unitary Approaches and Sectoral Coordination Generally

Regardless of each particular sectoral advisor's preferences, these choices are generally decided operationally in terms of factors intrinsic to national governance principles, operational mandates, and needs related to institutional development and authorisation. Moreover, sectoral and pathway legislation bears a strong relationship to the situation and practices of the particular sectoral agency with access to the pathway and the individuals and entities regulated under it. Accordingly, while there is a strong benefit in creating a central policy to guide implementation, pathway-based legislation will typically be seen to be inevitable and preferable to developing a centralised system or institution to address this issue. The primary exceptions to the statements made in the foregoing paragraph are found in a small number of small island nations,[194] in which invasives issues are recognised to have a central role in all aspects of the continued biological vitality of the country. Even in these countries, however, significant aspects of regulation are governed by other laws and institutions.

Many commentators, however, specifically recommend a unified approach, often resembling a modified EIA process. Even where not specifically recommending or favouring some type of unified legislative development, many still recommend some level of *de facto* unification through the creation of a coordinating body consisting of representatives of all involved ministries and agencies, with specified powers and responsibilities. Such bodies are rather commonly found throughout developing country governance,[195] and particularly in the legislation developed or recommended through international technical assistance over the past 20 years.

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[193] See, e.g, Shine, C., *et al.* at 38-42; IUCN Guidelines, 2000, Part 9 (strongly and affirmatively recommending a unitary approach ('a holistic policy, legal and institutional approach.')

[194] Especially NEW ZEALAND, through its biosecurity approach, consisting primarily of its Biosecurity Act of 1993, and Hazardous Substance and New Organisms Act of 1996. This approach has been closely followed in draft legislation in the BAHAMAS and a few other countries. CUBA has taken an alternate approach amalgamating all legislation dealing with environmental safety issues (from invasives/GMOs to reactor safety) in a single institution.

[195] ICELAND The Nature Conservation Act, Art. 41.

In practice, however, such bodies often do not live up to their mandate, for a variety of reasons including the following

- the members are too low-ranked within their respective agencies to make necessary commitments (in the coordinating body) or take necessary actions (in their respective agencies), and they may tend to hoard knowledge and information obtained;
- the law specifies high-level membership, which may inhibit the necessary frequency of meetings, and limit the amount of attention given to the coordinating body's issues within the agency or ministry;
- the number of such bodies which must be attended by each agency may be very large, so that relatively low levels of attention can be given to reports and recommendations coming out of each one;
- the actual authority of the body, regardless of legislative provisions, is compromised by the need to get majority or supermajority agreement before taking action.

Operationally, however, the most important problem with either of these primary mechanisms of coordination is the lack of an obvious benefit to the agencies or processes from the coordination effort. Even where unified invasives legislation is in place, its lack of a comprehensive or consistent policy/planning process for establishing priorities for action, and the fact that 'each aspect [of the unified law] contains its own set of slightly different criteria for action,' have been identified as critical shortcomings.[196]

In support of Sectoral Approaches

In the context of developing countries, it is worth reiterating the problem of 'regulatory paralysis,' described above. There is some basis for supposing that the multi-sectoral nature of the problem, and the perceived need to come to a single integrated response applicable in all sectors may be contributing to the lack of prompt progress on this important mandate. It may be counter-productive, therefore, to continue to press the option of a unified or integrated approach. Sectorally, for example, a law addressing the spread of species along watercourses may use very broad definitions of 'alien species' and 'introduction,' and focus on processes for involving the public in monitoring rivers and lakes, and empowering remedial action. A separate law, directed at the issuance of permits for species introduction may utilise different definitions, which more clearly identify the situations in which a permit is needed, and focus on clear regulatory responsibilities.

Scientific Resources as the "integrating Mechanism"

As noted at the outset of this report, however, despite the frequently unrelated nature of the *pathways* which (since they relate to human action) form the basis of legislation, there is one overarching similarity connecting the broad range of invasive species issues—the concept of *invasiveness*. While it is neither productive nor even practical to speak of regulating invasiveness, the scientific knowledge and characteristics of invasiveness are relevant to all of the various sectoral and other pathways of concern to the creation of an invasive species control framework. Moreover, the various factors and characteristics addressed with regard to invasiveness are of direct concern to all relevant agencies and sectors, even if the particular balances (of risk versus objective or benefit) differ widely among them.

[196] Christensen, M. 2004, evaluating the 'Weaknesses of [New Zealand's] Biosecurity Act.'

These scientific factors, including reliable data on the various species and ecosystem characteristics most relevant to invasives-related decision-making, have been strongly identified as a primary need for national implementation in most analytical materials reviewed for this paper. The lack of a coherent scientific process and institution in (or available to) each country for applying them has been another strongly recognised weakness in national implementation. Conversely, the small number of countries which have developed relevant databases and scientific information systems addressing these questions have expressed demonstrably fewer criticisms relating to lack of coordination.[197]

This suggests that the intrinsic scientific connection among all invasives issues might be the most appropriate basis for promoting integration and coordination among the sectors. Unlike the adoption of new documents or the creation of additional committees, such an approach provides the agencies (and regulated members of the public) with a sorely needed benefit, essential to the functioning of their various legal regimes on species introduction. The collaborative development of scientific facilities or databases could provide significant 'value addition' to the process of national regulation. By providing only non-biased scientific analyses, these facilities could be used by all invasives-related agencies across the region, in applying their legal and regulatory standards and decision-processes, regardless of the contents of those standards, or of particular agency's mandate regarding acceptable levels of invasives risks. Of course, they would also provides a budgetary benefit over the long term, eliminating the need for each agency to undertake separate needlessly expensive and duplicative measures.

This approach, however, requires a relatively long start-up time, as well as the commitment of funds (from donors or national coffers) for the development of relevant databases and sustainable institutions that will continue to operate them after initial funding has expired.

Recognition/use of International Guidance Documents

As noted above, a number of international, regional and other instruments provide guidance or embody commitments relevant to the implementation of invasive species control legislation. In the main, however, these instruments are phrased in hortatory language, and represent particular perspectives on relevant issues. Their primary purpose is to mobilise national action and decision, including the decision to go forward with development, revision, or integration of a national framework to address invasive species concerns. Such action, however, occurs at the primary policy level, rather than in the legislative drafting process. At the legislative stage, then, international guidance documents should be recognised as just that—'guidance'—rather than mandates, and used if and to the extent that they are appropriate to national circumstances.

There is one exception to the conclusion of the foregoing paragraph, however. One important potential value of such instruments is their reflection of international commonly held principles and standards—an aspect of international agreement that can be particularly important when a country is called upon to defend its species introduction laws in international trade forums. This role can be enhanced where and to

[197] Countries like MEXICO and COSTA RICA which have focused significant efforts over the past 15 years on developing these information resources, have identified other problems such as lack of enforcement and the need for inspection and laboratory funds and facilities, but have made significant inroads in adopting a collaborative approach among various ministries and institutions.

the extent that a significant number of national governments formally recognise all or part of a particular guidance instrument.

Consequently, the clarification of international principles relating to invasives controls would seem to be essential. In this connection, some of the most important direct guidance relating to invasive species policy approaches is found in the CBD's Guiding Principles for the Prevention, Introduction and Mitigation of Impacts of Alien Species that Threaten Ecosystems, Habitats or Species. These principles are more balanced in terms of recognising other governmental priorities than their forerunners, but remain true to their environmental roots in many provisions. Thus for example, the Guiding Principle 2 reflects a strong preference for prevention (allowing no introductions of invasive species), but express it in terms that recognise that until a species has been proven to be invasive, but do so in terms of cost-benefit analyses, reflecting the fact that, before it has been determined to be invasive, a species whose characteristics are not completely known may be introduced in order to achieve other essential social, environmental or economic objectives. The Principle also ties risk-acceptance decision making to the need to provide for 'early detection and rapid action… to prevent establishment.'

Recognition/use of International Standards

Equally, or perhaps more important, are the roles of recognised international standards for the control of invasive species. Focused on involuntary commercial introductions (hitch-hikers in commercial products in international trade), the standards developed under the IPPC, OIE, and various international trade agreements (including bilateral agreements between trading partners) are designed to satisfy the non-discrimination requirements imposed under international trade instruments. In many cases, these instruments are sufficiently detailed to form the basis of quickly adopted regulations, requiring only the relevant training of inspection officials in order to bring them into operation.

Preparation for this type of regulation can usually be relatively simple in national legislation. Given the relative urgency of prompt implementation, when such a standard is adopted internationally and meets the policy and technical needs of a country, it may be useful to give special attention to the concepts of regulatory adoption, examining which of legislative systems in the country have the shortest and most effective path from proposed regulation to adoption, and integrate lessons from that system.

Application of overarching principles and processes

One group of issues that is frequently canvassed in analyses of invasives legislation is the application of overarching principles (precaution, polluter pays, ecosystem approach, participation/access to information, and risk/impact assessment) relevant to invasives. While in general international guidance on the application of these concepts is well developed and generally applicable, two of these overarching principles, precaution and risk/impact assessment present particular challenges for the development and implementation of invasives legislation.

Precaution

Precaution, although a long adopted principle, is still generally not understood. In its simplest form it is simply a response to risk—as described in the CBD Guiding Principles note that 'lack of scientific certainty about the various implications of an invasion should not be used as a reason for postponing or failing to take ap-

propriate eradication, containment and control measures,'[198] One of the most controversial aspects of invasives-related precaution—its relationship to global trade—is discussed above in Part II.F. The following discussion identifies a few other aspects of precaution that should be considered in species introduction legislation.

Basic Concerns

The issue of precaution remains somewhat unclear, particularly when applied in the context of natural resource management.[199] In many implementing strategies, the concept is considered to apply to any uncertainty. Hence, if one is not certain of the extent of harm caused to a specific ecosystem by removal of a quantity of biological material from that area, these approaches would consider this a situation requiring 'precaution' and assume that a conservative approach should be applied (minimising the amount of resource takings allowed.) In fact, of course, there is no doubt about the existence of a risk in such a case—clearly the taking of biological material from an ecosystem risks some damage to one or more elements of that ecosystem. This type of misunderstanding evidences the nature of some of the remaining uncertainties regarding the correct implementation of the principle.

The CBD Guiding Principles strongly call on parties to "[a]pply the precautionary approach [in the form set forth as Principle 15 of the Rio Declaration] in all efforts to identify and prevent unintentional introductions [and] decisions concerning intentional introductions,… [as well as] when considering eradication, containment and control measures in relation to alien species that have become established."[200] With regard to GMOs that are considered alien species a further mandate is found in the Cartagena Protocol, which includes the precautionary principle as a direct commitment of the parties (i.e., not in a preambular provision) in three separate articles.[201] A number of countries have specifically

Box 3: Precaution and Invasive Species in the EU Biodiversity Strategy

The European Union, having recognised invasives as 'one of the main recorded causes of biodiversity loss and… serious damage to economy and health'[202] has addressed them in its 1998 Biodiversity Strategy,[203] calling on the Community to 'appl[y] the precautionary principle… [through] measures to prevent alien species cause detrimental effects on ecosystems, priority species or the habitats they depend on and establish measures to control, manage and, wherever possible, remove the risks that they pose." The EU's attempts to define more concrete mechanisms have so far occurred only through its Natura 2000 program (network of protected areas), and has begun discussions of specific legislation.[204] To date, Natura 2000's invasives-related efforts have included

- updating the list of known invasive species that pose an ecological threat to native flora and fauna, habitats and ecosystems within the EU;
- promoting the exchange of information on legislative measures and other experiences; and
- participation in the development of international guidelines on invasives under the CBD.

The 'known harms' focus suggests that legislative measures will primarily focus on known-harmful species (waiting for a species to demonstrate invasiveness), the primary pathways by which they have been introduced, and habitat remediation and restoration activities.

[198] Guiding Principles 1 and 10.2.

[199] *See generally*, Cooney, 2005. Involvement in the production of the detailed case studies described in this book is the basis of the author's evaluation of this issue.

[200] Guiding Principles 1 and 10.2.

[201] Cartagena Protocol on Biosafety, Arts. 1, 10(6) and 11(8).

[202] Meeting of the European Council of Ministers of the Environment, March 2002.

[203] (COM (1998) 42 final)

[204] Scalara, 2004.

attempted to adopt legislation relating to these requirements, including the EU (Box 3), which notes the essential tie between information development and precaution.

The Other Precaution—Avoiding the 'Empty Niche'

Another side of precaution arises where action is proposed to eradicate invasive species that have already taken hold in an ecosystem. It is necessary in such instances to evaluate the impact that the removal of species will have on the remaining ecosystem.

As noted above, invasiveness has many forms, and may in some cases be recognised (or become problematic) only many years after introduction. Examples exist, for example of invasives remediation actions addressing species introduced two millennia ago.[205] Consequently, it is undeniable that over time alien species will have integrated into (and caused evolutionary changes to) the ecosystems into which they were introduced. There remain, however, a variety of reasons for eliminating such species from their adoptive homes, including the fact that modern transportation and other factors are influencing the ecosystem and the invader's impact on it. In these remedial actions, the question may arise whether the ecosystemic impacts resulting from the removal of such a long term visitor will be more harmful than leaving the species in place.[206] One of the most frequently mentioned of these concerns is the fear external influences and species may be able to take advantage of the "empty niche" left by the eradication of a species that has fully usurped some particular place within the native ecosystem. Logically, this determination, too, (1) depends on the particular qualities of the species and of the particular ecosystem under consideration; and (2) may not be apparent within the first months or years following the eradication.

Hence, questions of "scientific certainty" arise concerning whether the eradication action will be more harmful to people and biodiversity within the area than leaving the species in place or taking less intensive measures. At a minimum, this suggests the application of the precautionary principle in another way with regard to invasive species—the need to take measures to protect against harms that might be caused by the eradication and other remedial actions. While EIA may be one tool in this process, the relative unavailability and insufficiency of scientific information and predictability may make such assessment unreliable.

Current Perplexities—Precaution and Invasives in CBD COP-6&7

Beginning in 2002, at the 6th Meeting of the Conference of Parties to the CBD, the issue of precaution has been identified as a particular point of controversy relating to invasive species. In the final plenary of that meeting, one delegation asserted eleventh-hour objections to the Guiding Principles, identifying the precaution language of the Guidelines as the underlying reason for this formal challenge. Apart from the fact that this language does not mirror the precaution language in either the Cartagena Protocol or the Rio Declaration, the exact nature of the objection was not clearly stated. Owing to a procedural

[205] A modern effort to eradicate viperine grass snakes (*Natrix maura*) from the Balearic Islands (specifically Majorca and Minorca,) which are believed to have been introduced at the time of the Roman empire. Serra, 2003.

[206] For two sides of this issue, see Lorvelec, 2003 (recording over a short term the 'consequence of alien disappearance) and IUCN-EARO, 2004 (examining the role of water fern (*Salvinia molesta Mitch*), water hyacinth (*Eichhornia crassipes*) and Nile cabbage (*Pistia stratiotes*) in Lake Naivasha where these species are alien and have invaded that ecosystem.)

abnormality in the Chair's response to the formal objection, the status of the final decision adopting the Guidelines remains controversial. Attempts at COP-7 to resolve it indicated that the objection had shifted and now encompasses a much broader range of trade issues, as well as continuing to press the precaution question.

At present, although the status of COP Decision VI-23 remains unclear, most delegations view that the decision is generally accepted, with the exception of the Guidelines, which are presumed to not be adopted. However, a complete set of 'Interim Guidelines' had been regularly adopted in COP-5 (2000) which are generally perceived to remain active pending the resolution of the current controversy. As those Interim Guidelines cover essentially the same material with essentially the same general contents, the above-described perplexities are thought to have delayed, but not curtailed the continued progress of the CBD and its Parties in addressing the primary requirements of Article 8h of the Convention—to 'prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.'

Environmental Impact Assessment and Risk Assessment[207]

Over the past 30 years, the tool of environmental impact assessment (EIA) has come to be recognised as a primary mechanisms for addressing environmental concerns, through the systematic identification of the potential impacts and the level of risk or certainty that they will arise in a particular proposed activity. EIA offers a flexible mechanism which enables the creation, design and analysis of 'mitigation measures' designed to minimise the possibility of negative impacts.

Similar objectives are addressed by various 'risk assessment' systems applicable in various countries and through various kinds of sectoral and general laws addressing civil and criminal liability and responsibility.[208] The suite of risk analysis processes relating to GMOs and new varieties of agricultural species form one of the most important and most broadly accepted categories of risk analysis, and are also perhaps the most directly relevant to invasives.

The role of EIA in the control of invasives can be very strong, particularly in developed countries. As part of this analysis, the author surveyed all litigation regarding or mentioning non-native, alien or invasive species that has been formally filed in the United States in the last 20 years. That survey identified dozens of cases, in which invasive species issues and risks were challenged through the EIA process.[209]

EIA and risk assessment practices embody two important factors in invasives legislation. First, the scientific mechanisms and risk assessment protocols are matters of direct and intensive research and development aimed at developing precise and objective bases for determining whether a species has become invasive. These mechanisms are equally desirable to industrial and commercial sectors as to government, given the potential for direct civil (and even criminal) liability where an individual or company is found to have been responsible for the introduction of species that are later found to be invasive.

[207] The distinction between EIA and risk assessment is sometimes difficult to explain to those not working directly with these concepts. It is probably not appropriate to embark on such a discussion in this paper, however, and the author does not have access to an appropriately focused article or publication as a source of further explanation of this point.

[208] Laws assessing or addressing hazardous substances, ultra-hazardous activities, and strict liability, for example, form the 'strict end' of the spectrum of personal responsibility laws, which runs from laws setting penalties and responsibility for negligence and oversight on the other end of the spectrum.

[209] Examples cited in note 150.

Second risk assessment whether undertaken on a case-by-case basis or more generically for the purpose of developing or amending black, white and grey lists, is a demanding process, requiring rigorous analysis of reliable data. The development of a multi-purpose institution or database directed at serving the scientific and informational needs of the risk assessment process can be an integrating factor creating a basis of common interest around which relevant governmental and civil society sectors can create a practical and mutually beneficial basis for coordination.

Selection of particular legislative tools

Perhaps as a result of the financial and practical magnitude of the task, many developing countries have been relatively slow to take primary decisions for the implementation of invasives objectives. This legislative procrastination has been explained in a variety of ways, and is often assumed to be a function of lack of awareness by governments—the assumption that 'most countries have not begun to develop legal instruments to tackle the issue, probably due to an underestimation of the dimensions and threats posed by invasive alien species.'[210] Upon direct investigation, however, this characterisation does not appear to be correct. National interest in and awareness of invasive species issues are often very intense. In many cases, the most significant obstacle is the lack of clear directions for addressing the problem, and concern that significant legislative and administrative efforts will not show marked positive outcomes.

As in many technical areas, a key issue of concern relating to each country's ability to effectively implement invasives controls will be national capacity (human, technical/physical and financial.) Few if any of the current tools and options for invasives regulation described in this paper can be made 'self-enforcing'—*i.e.*, can utilise a combination of legal incentives through which the regulated community itself will take the labouring oar in ensuring compliance. Rather, each option calls for a combination of technical, legal and administrative inputs that can be costly in both human and financial terms. Even choosing which to invest in can be problematic. To some extent, therefore, national policy-level decision-making will be most effective in the form of a plan for future action, identifying priorities and immediate needs as well as longer term requirements and objectives.

One particular problem for nearly all less-developed countries relates to the relative discord among OECD countries (basically between the United States and the European Union) over environmental concerns affecting or caused/enhanced by trade. In some instances (particularly the 'biosafety' and GMOs issues, but also commercial and packaging controls on other trade goods), differences and disagreements at the level of the most developed (and generally largest-consuming) countries can engender concerns in developing countries regarding the impact of selecting (and adopting policy aligning with) one side or the other.

The following pages briefly look at the basic tools and tool groups described in Part III, focusing only on those where there are particular less obvious factors that may specially affect the value or impact of the tool or the choice among tools, in developing countries.

Identification

As with virtually all of the tools identified in this paper, the identification tools are not alternatives but can potentially be used in combination. With

[210] Scalara 2004, citing Shine, 2000.

regard to identification of alien and invasive species that must be subject to regulation, for example, it must be noted that the list-based processes still require either standard-based decision-making or application of a scientific predictive model, except that in this case the standard will apply the selection of species to be added to the list, rather than to the particular case-by-case application.

For purposes of selecting an approach, the primary problem with any current predictive mechanism is the fact that it's predictive ability is not 100%. Existing predictive systems find it 'harder to predict plants that will not invade than those that would, meaning that the decision tree tars the name of many plants that would be likely to behave well.'[211] Conversely, in terms of their ability to catch true invasives, their success rate is always expressed in inconclusive terms ('likelihood,' 'probability' and/or 'potential' of invasion.) Consequently, such systems have been castigated as "creating a false sense of security" for policy makers.[212] From the environmental perspective, this means that decisions based on such mechanisms may allow the introduction of species that eventually are proven to be harmful. At the same time, in trade terms, they are also certain to give 'false positive' results.[213]

There is one important problem in the use of predictive mechanisms in developing—the fact that they may not be utilised comprehensively. "Blacklisting" processes tend to be reactive, rather than proactive, with species being listed only after they are proven to be invasive and harmful—something which occurs long after the problem can be eradicated or even effectively controlled.[214] Similarly, the application of model-based invasiveness assessment systems is generally not applied in all introductions, which again suggests that a species may be given a 'hard scrutiny' only after it is known to be invasive in the local ecosystems. Reactive approaches may not be the best option for developing countries, where the institutional capacity to engate in permit oversight and general ecosystem monitoring capabilities may be somewhat limited. At a minimum, these factors may suggest a need to develop pre-screening mechanisms and apply them as universally as possible, as an adjunct to either list-based systems or predictive models.

An advantage of a list-based system is that it may be easier to train inspectors and customs officers regarding a specific list than a more general prohibition on species introductions. Where it is possible to utilise a more specific model, a decision-based system may improve the basis of regulation, but the more individualised ap-

[211] Baskin, 2002, at 133.Australia's 'weed risk assessment' methodology discussed above, has been tested both in theory and in practice, and the governmental system has concluded that the correlation between its results and real situations is high enough that it can be used as a primary methodology for evaluating intentional species introductions. Efforts to identify invasive potential (focusing on 'such red flags as the ability to reproduce or spread by means of vegetative growth such as stolons or rhizomes rather than seeds, the ability to grow rapidly in the juvenile stage or reach maturity rather quickly, or the ability to produce seeds that sprout without any pre-treatment' (See e.g., Reichard, Hamilton, 1997) have been pretty good predictors (catching 76% of known invaders). Per Lonsdale, 2001, however, they appear to achieve this by being over-inclusive—producing an unreasonable number of 'false positives.' Scalara, 2004, estimates that 'the chance that an introduced species becomes a pest is about 1 out of 100" and that 'out of the number of species introduced to a given area, only 10% are likely to become naturalized and only 10% of these are likely to become invasive.'

[212] Simberloff, 1999.

[213] For example, the validity of the Australian WRA was established by testing the questions against 370 plant species already found in Australia. These included economic and environmental weeds, as well as other useful plants (Pheloung, 1996; Pheloung, 2001). The system rejected 100% of the serious weeds it was tested against and 84% of the minor weeds. It rejected 7% of non-weedy plants.

[214] Note for example the Lacey Act, under which animal and fish species may be listed only when they have been determined to be 'injurious' through a federal administrative rulemaking process.

plication processes may be more difficult to implement.

Two additional points of caution should be mentioned regarding the temptation to use another country's existing lists as 'models' or starting places for national legislative listing. First, of course, national and sub-national ecological factors form the primary basis for listing, and vary widely, even among countries that share a common boundary and appear ecologically similar in most ways. More important, however, many countries' existing list-based approaches evolved out of older systems whose creation did not focus on environmental impacts of the listed species,[215] and sometimes did not identify the particular reasons that must underlay the listing decision very clearly.[216] These systems form the basis of the GISS recommendations on invasives control. In general, they focus on eradication (destruction of listed weeds, wherever found on public and private property) supported by the prevention of any intentional introduction of such species. In some places, these long-standing systems have been extended to add lists of exotic species and invasives to the database of species that are controlled in this way.

Oversight/monitoring and Indicators

Oversight issues, and the problem of unintentional introductions and small movements of biological material without permits, are greatly exacerbated by the porous borders and lower levels of government scrutiny found in developing countries. The need to find locally overseeable 'choke points,' where both intentional and unintentional introductions can be monitored (*i.e.,* not to rely on border controls) appears to be a major requirement for successful invasives control legislation. This 'holy grail' of the legislative process would not only place regulation in a context that might be more easily carried out, but also create a basis for addressing the serious issue of domestic introductions from one ecosystem into another.

Government Empowerment and Obligations: Enforcement and Remedial Action

In the area of enforcement and compliance, the constraints facing developing-country legislative and administrative officials are not noticeably different from those arising in other countries. However, many developing country governance frameworks embody a high level of ministerial/regulatory separation among sectors and agencies. This can result in the inability to utilise one of the most effective methods for promoting compliance—cross-linking permits so that a violation relating to invasives may threaten an introducer's other commercially necessary permits and licenses. Consequently, one useful process in developing country legislative drafting relating to invasives might be to negotiate mutually beneficial relationships among permit issuing agencies, to enable permit linkage.

Financial Provisions

To some extent, financial issues form a problematic element of virtually all conservation legislation, and need not be discussed further in the context of invasives control legislation in developing countries. However, in a few specifics, financial measures suggested for northern and developing countries may not be appropriate

[215] Klein, Making a list, 2004, notes that most of these listings are based on their status as 'detrimental' to agriculture.

[216] See e.g., the Lacey Act, which is the basis for most of the US's invasives control efforts at the federal level, which originally allowed listing any fish or wildlife that was 'injurious to human beings or the interests of agriculture, horticulture, forestry or … wildlife resources.' 18 U.S.C. § 42(a)(1). See, also, Klein, Making a list, 2004 (describing this approach in the 'Great Lake' states of the United States.)

in the developing-country context. Specifically, surety bonding arrangements are generally less available and less dependable in developing countries, and quite expensive when purchased from a developed country insurer. This suggests that a bonding requirement for activities involving species introduction might operate as a *de facto* ban on those activities, in many places.

Transboundary Cooperation

Particularly where developing countries have 'porous' national borders, many key decisions in any sub-region must be made multilaterally. For example, the decision to add a species to a 'white list' cannot be solely based on whether the species is native or has been naturalised in a particular country. As recognised by the Global Invasive Species strategy, "Heightened awareness of bioinvasions has developed at the same time that national have been implementing an unprecedented round of global trade liberalisation agreements. These agreements have accelerated the worldwide movement of vessels, cargo, and people."[217] There is therefore, a serious need to evaluate whether and when species movement must be permitted.

More broadly and informally, it must be noted that many implementation-level inter-country communication issues are less problematic in developing countries. Among SADC countries, for example, the sharing of information at the unit-director level is strongly facilitated through sectoral meetings. This accepted informality, however, creates a different challenge—the lack of direct action at the ministerial and plenipotentiary levels. Thus, although many regional protocols have been adopted by the SADC Council of Ministers within the last 10 years, very few have been sufficiently ratified in order to enter into force.[218] Several unratified protocols (including Wildlife Enforcement and Forestry) were negotiated through in-depth work at the unit-director level from all SADC countries, and particularly address the needs for trans-border processes in addressing regional or sub-regional invasive species problems and focus on practical and informal implementation needs. Unfortunately these provisions have not received the necessary authority to become operational.[219]

Wherever it is necessary to provide information, notifications and other direct intergovernmental contact between sovereign countries, there are many legal and political issues and problems that may arise. Mechanisms for ensuring prompt, factual and appropriate contact can become complicated by diplomatic issues. Diplomatically and politically speaking, it may not be possible to enable free direct sharing of information between government agencies most decentralised . Several kinds of mechanisms exist, however, that may facilitate cross-border agency contact. Included among these are:

- the CBD's Clearinghouse Mechanism (CHM). It is important to recognise the somewhat unrealised potential of the CHM as an information-sharing tool. Where formerly, many countries virtually ignored the CHM based on the logistical infrastructural difficulties in connecting with the system

[217] Baskin, 2002 at 7.

[218] Official records of the SADC do not provide information on how many of the 22 protocols listed on its website (http://www.sadc.int/index.php?action=a1001&page_id=protocols) are in force, however, a random in-depth examination of 7 of them found only 2 had entered into force.

[219] The SADC process of using lower level administrators as primary negotiators of protocols may be the source of the problem. In negotiations, many of these instruments have been converted from international documents (phrased in the manner that sovereign countries and their parliamentary bodies can feel comfortable committing to) into strongly binding provisions, which mirror the drafting of national regulations, thereby creating potential for claims against countries failing to meet protocol obligations.

electronically, those problems have more recently been addressed, in part by the improvement of electronic communications in many regions, but also by direct efforts of the Convention Secretariat which has developed (and will provide to any party requiring them) systems and tools (including regularly downloaded CD-ROM formatted information) to enable the CHM to be a functional source of information-sharing.

- The use of recognised nongovernmental organisations for intercession between government officials at implementation levels. This approach is often possible because government officers who may be completely interdicted from contacting their opposite numbers in a neighbouring country are freely allowed to interact with NGOs. A good example of this type of relationship is the role of TRAFFIC International acting as a go-between in facilitating intergovernmental cooperation on CITES implementation and enforcement. TRAFFIC can provide an informal network enabling governments to share information on illegal transborder movement of specimens. Where government contacts might take weeks through official channels, utilisation of TRAFFIC enables a wildlife control officer who has discovered that a shipment is moving internationally to get that information to his opposite number in the destination country before the airplane touches down.

- The development of informal organisations to enable communication. An example of this is also found in wildlife trade law, where European prosecutors, who have typically faced unendurable delays in their efforts to provide and obtain information regarding transboundary crimes have formed a network by which they have developed a governmentally pre-approved process for short-cutting the red-tape with regard to certain transborder official communications.

Small and Unintentional Violations

As noted above, virtually none of the provisions described in Part III have any realistic chance of altering the behaviour or impact of the actions of most individuals and small businesses who unintentionally, unknowingly, or illegally introduce alien species. As a consequence, most of the tools and approaches described have found their greatest successes in addressing operations that are much larger than most commercial enterprises operating in developing countries.

Where large or financially significant commercial enterprises which intentionally import non-native species will generally be aware of laws relevant to their operations, and will recognise the need to comply with the law as a cost of their business operations, smaller enterprises, even though large by developing country standards will not. Unlike the enterprises regulated in developed countries, many importing companies operating in developing countries are smaller, and thus less likely to trigger direct inspection, checking and reporting requirements at border crossing, transportation, marketing, and other elements of the movement of goods that may be alien species (or are potential carriers of hitchhikers). Most significant, large businesses regulated in developed countries are used to viewing themselves as 'deep pockets'—that is, they know that if their actions cause harm to the government or to persons or commercial enterprises, they will be obvious targets for civil or criminal litigation to recover damages and penalties, because

(1) they will usually have sufficient financial resources to pay all or a significant part of the damages involved, and

(2) any such violations can be expected to be repeated in future shipments, suggesting that there is a greater long-term value in 'teaching the lesson' that violations can be costly in time and money.

By contrast, actions of small and medium-sized companies, and individual violations, often represent a 'one-shot' situation. The violator may not know of the relevant law, or may not understand that the materials he is transporting or releasing are covered by it. In some cases, small business and individual violators may be aware of the law, but willing to take the chance of being caught, given that the percentage chance is small, and the time and effort involved in permit compliance may be quite significant (often taking nearly as long for a few specimens as for a full container.)

The question of how to deal with these small and unintentional violators is a serious one, but one without any completely satisfactory enforcement solutions. In facing these issues, it is important to keep them in perspective, both in terms of the volume of violations and the level of risk posed. Hence, it may be appropriate to delay dealing with these perplexities until the primary processes are in place for dealing with (i) larger operations (such as agricultural seed importers) and (ii) industries that carry a historically higher than usual risk of bringing in invasives (especially, ornamental plant companies, aquaculture industries, and aquarium fish.)

Once these primary pathways posing the greatest threat have been addressed, it is currently possible to consider the adoption of legal tools that may possibly prove useful in the broader process of addressing individual and small violators, including—

- Directing primary responsibility to the major or more directly regulated commercial pathway by which the individuals obtain or transport the specimens—*i.e.*, imposing some level of accountability (including industry-wide assessments or the loss of incentive or tax benefits) on the companies which sell the non-native species that become invasive, in the event of future problems.[220] These provisions should be carefully drafted to avoid problems of proof or conflict with international trade agreements;

- Public awareness programmes (although cited with tiresome regularity in environmental contexts, such programmes are one of a small number of tools capable of helping to minimise environmentally inappropriate behaviour);

- Incentive programmes (and well publicised disposal centres and other facilities) promoting compliance with safety measures relating to the most common unintentional or casual violations;

- 'Community conscience' programmes which create incentives and increase the likelihood that small and non-commercial introductions and releases will be observed and reported.

Another interesting option is that of collaboration. A programme that links all landowners and rights-holders in a particular area, under a common goal of controlling particular weeds and other invasive species can serve a dual purpose:

[220] One example is found in SOUTH AFRICA Conservation of Agricultural Resources Act of 1983, which imposes criminal penalties on those who sell or otherwise disseminate seeds or parts of any species declared a 'weed.' At § 5. In theory, at least, if the supply of such seeds diminishes, the extent of the problem may diminish as well.

- coalescing people whose commitment to weed control may be minimal owing to the knowledge that their individual efforts alone could never make any realistic difference in an area-wide problem; and
- raising the profile of the issue within the community.[221]

[221] See, e.g., the Yellowstone County Integrate Weed Management program.

5 Conclusions—taking legislative controls to the next level

Even if not a majority position, there are clear indications that in each country there is significant interest in addressing invasive species problems. One aspect of this objective—which has frequently been seen as an insurmountable obstacle—is the need for an appropriate legal framework. While the successful resolution of this first problem does not guarantee that funding and political support will materialise, it is undoubtedly an important component of ultimately achieving the objective.

Each of the mechanisms and legislative approaches described in this paper can become the subject of additional guidance, and the development of a true 'legislative toolkit'—a description of the various points and issues to be considered in crafting each element. This kind of direct assistance will be one more mechanism that can be of great assistance to countries in developing their frameworks for invasive species.

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